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Subject:

Former Plainwell Impoundment 2009 Bank Conditions Monitoring Report
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Dear Mr. Borries, Mr. Bucholtz and Ms. Hanshue:

On behalf of Georgia-Pacific LLC (Georgia-Pacific), please find enclosed the Former Plainwell Impoundment 2009 Bank Conditions Monitoring Report (Monitoring Report), submitted pursuant to Paragraph 15g of the Administrative Settlement Agreement and Order of Consent for Removal Action (Docket No. V-W-07-C-863) and Section 5.6.5 of the Work Plan.

The Monitoring Report provides a description of the banks in the former Plainwell Impoundment Time-Critical Removal Action area, as observed by representatives of the USEPA, MDEQ, MDNR, and Georgia-Pacific on multiple occasions through the summer and fall of 2009. The Monitoring Report is the first of a series of annual reports that will be prepared and submitted by Georgia-Pacific during the three years of bank monitoring and maintenance that will follow the receipt of the Notice of Completion of Work pursuant to Paragraph 77 of the Order.

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B0064536.00670



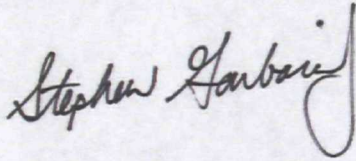
ARCADIS

Mr. Borries
Mr. Bucholtz
Ms. Hanshue
October 28, 2009

If you have any questions about this report, please contact me directly. Thank you.

Sincerely,

ARCADIS



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Vice President

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DRAFT FOR FEDERAL AND STATE REVIEW

**Allied Paper, Inc./Portage Creek/
Kalamazoo River Superfund Site**

**Former Plainwell Impoundment
2009 Bank Conditions Monitoring
Report**

Georgia-Pacific LLC

October 2009



DRAFT FOR FEDERAL AND STATE REVIEW

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**Former Plainwell Impoundment
2009 Bank Conditions
Monitoring Report**

Allied Paper, Inc./Portage Creek/
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1. Introduction

This *Former Plainwell Impoundment 2009 Bank Conditions Monitoring Report* (Monitoring Report) presents the results of bank monitoring activities performed in the former Plainwell Impoundment located on the Kalamazoo River in Plainwell, Michigan (Figure 1). Per the Administrative Settlement Agreement and Order of Consent for Removal Action (AOC), Docket No. V-W-07-C-863, dated February 21, 2007 (U.S. Environmental Protection Agency [USEPA] 2007), monitoring is required annually for a period of 3 years to evaluate the status and stability of banks and floodplain areas that were restored following the Time-Critical Removal Action (TCRA) activities completed in fall 2008.

1.1 General

The restoration and monitoring activities described in this Monitoring Report were performed in accordance with the USEPA-approved *Former Plainwell Impoundment Time-Critical Removal Action Design Report* (Design Report) (ARCADIS BBL 2007a), the *Construction Quality Assurance Plan* (ARCADIS BBL 2007b), and per post-construction monitoring discussions with representatives of USEPA, the Michigan Department of Environmental Quality (MDEQ), the Michigan Department of Natural Resources (MDNR), and the U.S. Fish and Wildlife Service (USFWS) (MDEQ, MDNR, and USFWS are collectively referred to as the Trustees).

1.2 Project Area Description

The former Plainwell Impoundment is located in Gun Plain and Otsego Townships, downstream of Plainwell, Michigan. It is roughly bounded on the upstream (or southeastern) end by the Main Street Bridge in Plainwell, and on the downstream (or northwestern) end by the Plainwell Dam (Figure 1).

As described in the Design Report (ARCADIS BBL 2007a), when in operation as a hydroelectric facility, the Plainwell Dam had a head of approximately 13 feet, and impounded water covering an area of approximately 123 acres. The MDNR drew down and partially dismantled the dam in the 1970s and 1980s, and as a result, the remaining sill of the dam had a head of approximately 5 feet and impounded a surface area of approximately 44 acres. The remaining impoundment encompassed approximately 1.9 miles of river, with an average width of 197 feet and an average water depth of 3.7 feet. The channel slope within this reach was approximately 4.6 feet/mile after draw down.

As described in Section 1.2 of the Design Report (ARCADIS BBL 2007a), the former Plainwell Impoundment has been the focus of a series of investigations by ARCADIS (formerly known as

Blasland, Bouck & Lee, Inc [BBL] and ARCADIS BBL), MDNR, and USEPA since 1993. The results of these investigations formed the basis for the TCRA and delineation of removal area boundaries.

The USEPA determined that the concentrations of polychlorinated biphenyls in the sediments, river bank soils, and floodplain soils of the former Plainwell Impoundment posed an imminent and substantial danger to both human and ecological receptors (USEPA 2007). As a result, the USEPA determined that a TCRA was necessary to address the contamination. After completion of the TCRA, approximately 12,650 feet of banks in the removal areas were graded and stabilized to minimize erosion and to provide a substrate suitable for vegetation restoration.

Banks were stabilized using a combination of sand backfill and river run rock to create stable slopes and minimize erosion, and topsoil was installed as necessary to support revegetation. Vegetation and riparian habitat was established by seeding and planting in three different hydrologic zones. The basis for the design of these zones is described in Section 2.7 of the Design Report (ARCADIS BBL 2007a). Native plant species reviewed and approved by MDNR prior to use were provided and installed in habitat restoration areas by a local nursery. Following installation of woody vegetation, saplings were tied to two stakes for support and all species were surrounded with a ring of woody mulch. The majority of the bank backfilling was completed by September 2008. Bank revegetation activities were completed in Removal Areas 1 through 6B in October 2008 and vegetation of the remaining removal areas (Removal Areas 7 through 13) was completed in June 2009.

Some temporary access roads have been left in place to enable access for bank repairs and vegetation planting. These roads will be removed when no longer needed, and the underlying ground will be restored by removing the road material and fabric, disking the ground surface to un-compact the topsoil, and seeding with the upland seed mix to restore vegetation. Restored access road areas will be included in subsequent monitoring activities.

Kalamazoo River flows at the Comstock gage exceeding the 2-year storm event (2,940 cubic feet per second [cfs] [MDEQ 2007]) occurred in September 2008 (9-day duration with 5,660 cfs maximum flow, approximately a 25-year storm flow based on communication with MDEQ [MDEQ, pers. comm. 2009]), December/January 2008-2009 (3-day duration with a 3,370 cfs maximum flow), February 2009 (4-day duration with a 3,320 cfs maximum flow), and March 2009 (7-day duration with a 4,580 cfs maximum flow). Banks and riparian habitats observed to be stable after these storm events can be concluded to be stable. Restored banks that showed signs of erosion were further evaluated to determine the need for adaptive management or

bank repair activities. Bank repairs required in 2009 were discussed with USEPA and the Trustees and are summarized in Section 5.2.

1.3 Bank Conditions Monitoring Program

In accordance with the AOC and as detailed in the Design Report (ARCADIS BBL 2007a), monitoring of the restored banks is required to be performed annually for 3 years—this Monitoring Report discusses data collected in June and August 2009 to satisfy the 2009 annual monitoring requirement. The 2009 monitoring program consisted of the following activities:

- Visual inspections and evaluations of bank condition
- Instrument topographic survey of bank profiles at 11 permanently benchmarked locations
- Quantitative assessment of bank stability using the Bank Erosion Hazard Index (BEHI) developed by Rosgen (2006)
- Quantitative evaluation of vegetation establishment (percent ground cover and percent weed cover) and survival

A collaborative project area walkthrough by ARCADIS, Georgia-Pacific, USEPA, and the Trustees was conducted in late spring 2009 to evaluate bank stability and determine if any maintenance activities were required. Subsequently, a revised process for collection and submittal of monitoring data was developed with USEPA and the Trustees to enable their review of preliminary data following the spring monitoring events rather than reviewing the data in a monitoring report submitted at the end of the year. This will allow for completion of repair and maintenance activities before the end of the reporting year rather than waiting until the following year. This revised process is discussed further in Section 6.

Because this process was established in summer 2009, this Monitoring Report presents the results of spring and summer 2009 monitoring activities, but does not include a discussion of maintenance activities that are currently being developed for implementation in 2009. Bank repairs to be completed in 2009 are the subject of a separate memorandum (ARCADIS 2009) that has been provided to USEPA and the Trustees for review and approval prior to implementation. The repairs are scheduled for fall 2009.

1.4 Document Organization

The remainder of this Monitoring Report is organized into seven sections, consisting of this introductory section (Section 1) and the following six sections:

- Section 2 - Performance Standards. Presents the performance standards that were established to evaluate the success of the restored areas.
- Section 3 - Monitoring Methodologies. Summarizes the methods that were used to perform the annual monitoring activities.
- Section 4 - Monitoring Results. Presents the results of the 2009 annual monitoring efforts and compares the results to the established performance standards.
- Section 5 – Maintenance. Describes adaptive management or maintenance activities that have been conducted in 2009 or will be performed in 2010 to assist in achieving the performance standards. Bank maintenance activities that will be conducted in Removal Areas 8 and 9B in fall 2009 will be described in the 2010 monitoring report.
- Section 6 - Future Monitoring and Reporting Activities. Summarizes the approach agreed upon with USEPA and the Trustees for future monitoring and reporting activities.
- Section 7 - References.

2. Performance Standards

Preliminary monitoring requirements and performance standards were developed during the preparation of the Design Report (ARCADIS BBL 2007a). Performance standards are quantitative measures that are used to evaluate bank stability and vegetation survival and development.

2.1 Percent Vegetative Cover

The **first performance standard requires that 85% of the ground surface be covered by vegetation by the third growing season.** Restored banks in the project area were seeded with seed mixes appropriate for the hydrologic conditions present in zones exhibiting frequent inundation (Zone 1), infrequent inundation (Zone 2), or upland (Zone 3) conditions. Zone 1 was seeded and planted with live woody stakes. Zones 2 and 3 were seeded and planted with a variety of tree and shrub species adapted to the hydrologic conditions in which they were planted. The percent cover evaluation methodology utilizes percent cover data collected from randomly-located standardized sampling quadrats, as discussed in Section 3 of this Monitoring Report. Meeting or exceeding the 85% ground cover performance standard indicates that the vegetation is developing into a community that will be self-sustaining. If the 85% ground cover performance standard is not being met in the second monitoring year and it is determined that the vegetation is not developing adequately to meet this performance standard by the third growing season, adaptive management maintenance activities will be implemented to improve the vegetative community, as discussed in Section 5.3 of this Monitoring Report.

2.2 Survivability and Natural Recruitment of Woody Vegetation

The second vegetation-based performance standard is related to the survival and natural recruitment of woody vegetation consisting of native trees and shrubs. Trees and shrubs of various sizes were planted in Zones 2 and 3 that supported woody vegetation prior to disturbance during the TCRA. Planting density reflected densities observed during pre-disturbance characterization activities and consisted of 125 shrubs and 50 trees per acre in Zone 2 and 225 shrubs and 75 trees per acre in Zone 3 to create the desired community. The **performance standard for woody vegetation is the presence of 85% of the total number of trees and shrubs planted by the third growing season.** The methodology for determining the quantity of trees and shrubs present in restored areas is discussed in Section 3.2 of this Monitoring Report. Naturally recruited native tree and shrub species that become established in the project area are counted for comparison to the original stem density as they are positive indicators that appropriate environmental conditions have been established for the desired plant community. If 85% of the number of originally planted trees and shrubs do not become

established by the third growing season, adaptive management maintenance activities will be implemented to improve the vegetative community, as discussed in Section 5.3 of this Monitoring Report.

2.3 Bank Functionality in Restored Areas

Quantitative performance standards were not established to evaluate bank stability. The amount of bank armoring incorporated into the bank restoration design considered concerns about limiting bank use by wildlife if too much armor were present. The degree of armoring is less than would be included if wildlife issues were not considered, and reduces the ability to state affirmatively that the banks are completely protected against all reasonably possible mechanisms of erosion-related failure. However, the armor design considered stretches in the project area where erosion protection needs are low, or where some bank erosion may be acceptable. Therefore, the objective of bank monitoring activities is to evaluate the functionality of restored river banks towards the overall stability of the river system, its floodplain, and its associated riparian habitat. The overall stability of the river system and floodplain requires a stable planform, pattern, and dimension, which are evaluated by the monitoring transects and BEHI evaluation. The functionality of the riparian habitat is based on the development of the desired plant communities, which are evaluated by vegetation monitoring and metrics. Monitoring objectives do not focus on whether or not erosion is occurring, but on whether any erosion is jeopardizing the stability of the river system or its top-of-bank land uses. Lateral erosion associated with natural river processes that increase the interaction of the Kalamazoo River with its floodplain are considered acceptable. However, vertical erosion behind bank or toe rock protection that could result in significant bank failure will be addressed through an adaptive management approach.

The stability and acceptability of restored banks are determined based on visual inspections and quantitative evaluations. Discussions of visual evaluations and the use of the BEHI to evaluate temporal changes in bank condition are presented in Section 3.

3. Bank Monitoring Methodology

The following sections describe the specific methodologies that were used to monitor restored banks.

3.1 Visual Inspection

During bank inspection, restored banks were inspected for signs of erosion that would jeopardize the integrity of the banks or their functionality in the river system. The limits of a "bank" extend from the toe-of-slope to the first visually observable break in slope. Signs of significant erosion include toe erosion causing undercutting, lateral erosion above the rock protection, exposed geotextile fabric, or vertical erosion down the face of the bank from overland flow entering the river. Stability was evaluated by visual observation and comparison to design drawings, considering location in the river, physical dimensions, and consistency with adjacent, undisturbed banks. The Design Report (ARCADIS BBL 2007a) specifies that at least one bank monitoring event be performed after the bank has been exposed to a 2-year, or greater, storm event. A 2-year, or greater, flood represents a high-stress exposure for restored banks and presents a relatively high potential for bank failure.

Informal bank inspections were completed in the fall and winter 2008 and spring 2009, but the formal documented bank inspection was performed on August 19 and 20, 2009. Future formal bank monitoring events will be performed in the spring after water levels have receded following the typical spring flood, but will target the month of June. Monitoring activities completed in 2009 consisted of a visual inspection of bank conditions, photographing the banks, and recording conditions of note, including:

- Obvious signs of gullying or rill erosion
- Bank undercutting
- Signs of sloughing (i.e., cracking or bulging visible at the surface)
- Loss of armoring materials (i.e., loss of stones, erosion control matting, and/or vegetation)
- Any obvious signs of lateral bank movement (i.e., due to erosion or deposition)

3.2 Topographic Survey

In addition to the visual inspection of the banks, bank profiles were surveyed at 11 permanently-monumented transect locations in June 2009 to compare bank geometry to post-construction conditions (Figure 2). These locations will be resurveyed in the spring (May/June) of each monitoring year. Future comparisons will present the surveyed cross-section from the previous year overlaid with the new survey data to evaluate changes in bank geometry. Although there is no quantifiable performance standard associated with this effort, the comparison of bank geometry over time will be used in combination with the visual inspection and the BEHI results to develop a weight-of-evidence approach to evaluating bank stability.

3.3 BEHI Ranking

The third component in the bank monitoring methodology utilizes the BEHI developed by Rosgen (2006). The BEHI integrates information regarding the relationship of the top-of-bank height to the bankfull water elevation, the vertical extent of root penetration in the bank, the root density, the bank angle, and the percentage of bank surface protected by vegetation or armor to identify a qualitative erosion hazard ranking of "very low", "low", "moderate", "high", "very high", or "extreme" (Table 1). BEHI data were collected in August 2009 along restored bank areas and, based on the BEHI ranking resulting from the collected data, each section of bank was assigned an erosion hazard potential classification. The lengths and locations of the erosion hazard classifications establish the baseline for future comparisons in 2010 and 2011. Each monitoring year, BEHI data will be collected and each restored section of bank will be assigned a ranking. A comparison of the BEHI rankings over the 2-year period will indicate trends in bank stability and may assist in identifying problem bank areas. The first comparison of the BEHI data will occur in 2010.

3.4 Vegetation Monitoring

Areas of restored vegetation will be monitored for 3 years and the percent cover and stem densities will be compared against performance standards to evaluate the development of the desired plant communities. Woody vegetation monitoring was performed on May 20 and 21, 2009 and herbaceous vegetation monitoring was performed on August 17 and 18, 2009. Future woody and herbaceous monitoring activities will target May/June and July/August, respectively. Additional inspections may be performed during drought or flood conditions that could significantly affect the survival of planted vegetation. Vegetation monitoring inspections were performed to evaluate the health and growth of planted vegetation and to determine whether stressful environmental conditions (e.g., insect infestations, drought) are jeopardizing plant survival.

The counting of trees and shrubs in the restoration areas was performed during the spring season (May/June) when the herbaceous vegetation is still low enough to allow for easy observations of trees and shrubs. The tree count was performed by inspecting the restored portions of the project area planted with trees and shrubs and counting all live native trees and shrubs in the planting areas. The number of observed woody plants was compared to the number of trees and shrubs originally planted to determine the percentage of the original planted stem density that currently exists in the planting area.

The summer (July/August) annual monitoring inspection consisted of the collection of herbaceous ground cover data during the peak growing season to assess the health and development of herbaceous vegetation restored by seeding. Visual assessment of the total percent ground cover and the relative percent ground cover of all identifiable species was collected from 1-meter-square plots located randomly throughout restored habitats at a frequency of 10 plots per acre. The mean percent ground cover of all of the data plots was compared against the 85% ground cover performance standard that must be met by the third growing season. Meeting or exceeding the 85% ground cover performance standard indicates that the vegetation will be self-sustaining.

4. Bank Monitoring Results

Bank inspection and survey activities were performed on August 18 to 20, 2009. The cross-sections of the restored banks at the 11 permanent transects identified on Figure 2 are presented on Figures 3 through 10. The BEHI data are summarized in Table 2 and the erosion hazard rankings for the restored banks are presented on Figure 11. The following sections summarize the results of the BEHI calculations, the surveyed transect comparisons, and the vegetation monitoring.

4.1 Bank Erosion Hazard Index Rankings

Restored banks for the entire length of the project area were assigned BEHI rankings based on bank characteristics observed in the field. Each length of bank that exhibited similar characteristics to a previously-characterized length of bank was assigned the same alphabetical label (A through O) in the field. Sections of bank with characteristics different from previously-characterized banks were assigned new alphabetical labels. Bank areas from which data were collected were also assigned a number that corresponds to the labels presented in Table 2. Data collection was replicated in some bank areas. BEHI rankings were calculated for each bank area based on observed field characteristics and the corresponding values derived from Table 1. Photographs of the typical characteristics of the BEHI categories are presented in Attachment 1. The BEHI rankings resulted in 53% (6,770 feet) of the banks being classified as having a very low erosion potential, 26% (3,238 feet) classified as low erosion potential, 17% (2,087 feet) with a moderate erosion potential, and 4% (555 feet) with a high erosion potential. As shown on Figure 11, the bank areas with high erosion potential are associated with Removal Area 6B on the south bank downstream of the US-131 Bridge and in the gas pipeline area in Removal Area 11A on the north bank that was regraded during the bank inspection activities and was void of vegetation. Bank areas with moderate erosion potential were identified on the south bank immediately upstream and downstream of the US-131 Bridge (Removal Areas 4B and 6B), on the south bank where a low bench was observed to be eroding and in need of repair (Removal Areas 8 and 9B), on the north bank immediately upstream of the former dam (Removal Area 13A), and in small areas upstream and downstream of the regraded gas pipeline (Removal Areas 11A). In general, the majority of the restored banks appeared to be stable following visual inspection, with good vegetation establishment and minimal erosion. All banks with rock protection were stable and filling in with vegetation. Banks without rock protection exhibited varying characteristics. These results provide baseline conditions for comparison purposes in future monitoring years.

4.1.1 Comparison of Surveyed Banks

The locations of the 11 transects selected to evaluate bank geometry over time are shown on Figure 2; the surveyed cross-sections at each transect location are presented on Figures 3 through 10. Detailed bank survey data were collected immediately following the physical restoration of the bank, and in this first monitoring year, the current bank profiles are compared to the post-construction bank profiles. The banks at these locations will be surveyed each monitoring year to determine if bank geometry is changing over time. Brief descriptions of the observations from these comparisons are presented below.

- T-1N – This transect is located on the north bank in Removal Area 1. The bank at this transect location exhibits a stable slope and possible sediment accumulation.
- T-2N – This transect is located on the north bank in Removal Area 3A. It also appears stable with a slope similar to design and some potential sediment accumulation at the toe-of-slope.
- T-2S – This transect is located on the south bank in Removal Area 3B. It appears to be similar to its design with a stable slope and some possible sediment buildup on the bank.
- T-3N – This transect is located on the north bank in Removal Area 4A. Some minor erosion may be indicated by the differences between design and survey, but a stable bank slope appears to be established.
- T-3S – This transect is located on the south bank in Removal Area 4B. Current conditions match well with design grades at this location.
- T-4N – This transect is located on the north bank in Removal Area 5A. Some possible toe erosion can be seen in this transect but overall the bank appears to have a stable slope, similar to design.
- T-4S – This transect is located on the north bank in Removal Area 4B. Some accumulation of sediment may be occurring at the mean water elevation and the remainder of the bank closely matches design grades.
- T-5N – This transect is located on the north bank in Removal Area 6A. The current and design bank grades match well at this location and some sediment accumulation may be occurring at the toe of the bank.

- T-5S – This transect is located on the south bank in Removal Area 6B. Some toe erosion may be occurring at this location as the bank slope appears steeper than the design.
- T-6S – This transect is located on the south bank in Removal Area 7. Some bank erosion may be occurring near the top of the bank, but the surveys match up well overall.
- T-7S – This transect is located on the south bank in Removal Area 8. Some significant erosion may be occurring at this location as evidenced by the loss of the designed slope and a steepening of the bank angle.
- T-8N – This transect is located on the north bank in Removal Area 9A. The bank at this location is very similar to design.
- T-8S – This transect is located on the south bank in Removal Area 9B. Some bank erosion may be occurring at this location as indicated by a loss of bank height and a steepening of the bank slope near the mean water level.
- T-9N – This transect is located on the north bank in Removal Area 10A. Some toe erosion may be occurring on the bank at this location as evidenced by a steepening of the bank and the loss of material at the toe.
- T-9S – This transect is located on the south bank in Removal Area 10B. The bank appears similar to design at this location.
- T-10N – This transect is located on the north bank in Removal Area 12A. The majority of the bank at this location is similar to design. Some minor loss of material may be occurring at the first bank grade break, resulting in a more stable (less steep) bank slope.
- T-10S – This transect is located on the south bank in Removal Area 10B. The bank appears similar to design at this location.
- T-11N – This transect is located on the north bank in Removal Area 13A. The bank at this location appears similar to design with some possible accumulation of material near the mean water level.
- T-11S – This transect is located on the south bank in Removal Area 13B. The bank appears similar to design at this location.

These results provide baseline conditions against which future survey data will be compared to evaluate changes in bank geometry.

4.1.2 Vegetation Monitoring

4.1.2.1 Woody Vegetation

The evaluation of the number of woody plants present in the restored habitats was conducted on May 20 and 21, 2009. Select photographs of vegetation in the removal areas are presented in Attachment 2. In May 2009, planting was being completed on portions of Removal Areas 10A, 11A, 12A, 13A, and 13B. Therefore, the number of woody plants planted in 2008 was summed with the number of woody plants being planted in May 2009 to develop the total stem count planted. The number of woody plants planted in May 2009 was added to the number of woody plants counted in 2009 (i.e., those planted in 2008) to develop the total 2009 stem count. The results of the stem count are summarized in Table 3. As shown, a total of 3,810 plants were planted in the project area and 3,022 stems were counted in 2009, resulting in 79% of the original planted stem count being present. The 79% stem density does not currently meet the 85% performance standard that must be met by the third growing season. Therefore, an evaluation of the need for supplemental planting will be conducted following the stem count to be conducted in spring 2010. If a sufficient number of native natural recruits are observed to meet the 85% performance standard, supplemental planting will not be required. If an insufficient number of stems are counted in 2010 or 2011, supplemental planting will occur, as discussed on Section 5.3 of this Monitoring Report.

4.1.2.2 Herbaceous Vegetation Monitoring

Herbaceous vegetation monitoring was performed on August 17 and 18, 2009. Select photographs of vegetation in the removal areas are presented in Attachment 2. A total of 124 sample plots were randomly distributed throughout the restored areas to represent the herbaceous vegetative community. The total percent ground cover of each plot and the percent cover of each identified species in the plot were recorded and presented on a removal area-specific basis in Attachment 3. The average percent cover of all plots was 97%, as summarized in Table 4. This result indicates that the applied seed mixes were appropriate for the conditions in which they were applied. Although the 85% ground cover performance standard does not have to be met until the third growing season, it has been met in the first monitoring year. The herbaceous vegetation will continue to be monitored for 2 more years to ensure that the performance standard continues to be met. The restored herbaceous vegetation does not require any maintenance at this time.

5. Maintenance Activities

5.1 Weed Control

Implementation of an exotic/invasive species control program is one part of a successful revegetation program. Species to be monitored for the project area include exotic/invasive species and other aggressive species with a tendency to develop into mono-cultures, such as broad-leaved cattail (*Typha latifolia*), common reed (*Phragmites australis*), multiflora rose (*Rosa multiflora*), purple loosestrife (*Lythrum salicaria*), reed canary grass (*Genus species*), autumn olive (*Elaeagnus umbellata*), garlic mustard (*Alliaria petiolata*), and yellow iris (*Iris pseudacorus*).

Control of exotic/invasive species may be accomplished through the physical removal of specimens, or through broadcast or spot spraying of glyphosphate herbicide, such as Rodeo®, by a licensed applicator. Initial exotic/invasive species control was performed concurrently with restoration activities. Additional weed control activities that may be required over the 3-year monitoring period will be discussed with USEPA and the Trustees.

During the 2009 spring inspection, several patches of reed canary grass were observed in restored habitat areas. Rather than let the plants go to seed and continue to spread through the restored areas, JF New was retained to treat the reed canary grass with an herbicide to control it early in the growing season. During the summer monitoring inspection, much of the reed canary grass that had been treated was observed to have died back. The status of weeds in the restored areas will continue to be evaluated during future spring and summer inspections and maintenance activities will be implemented, as required, to address exotic/invasive species. Although USEPA and the Trustees agreed that the weed control was appropriately performed at the correct time of year, USEPA and the Trustees were not notified prior to the maintenance activity. In the future, USEPA and the Trustees will be notified of any planned maintenance activities before they are implemented.

5.2 Bank Repairs

In consultation with USEPA and the Trustees and following several inspections, a bank repair was implemented in 2008 at Removal Areas 6B and 7B. It was concluded that the erosion resulted from preferential flow pathways that emerged following the removal of an island downstream of the US-131 Bridge and the creation of a near-shore channel during the TCRA. The bank repair was designed and presented to USEPA and the Trustees and the repair was implemented upon receipt of their concurrence. The repair consisted of armoring the bank with

river rock and installing a coir blanket at the anticipated bankfull water elevation to protect the bank and allow establishment of vegetation. The bank is currently stable and well vegetated.

In 2009, during a bank inspection with USEPA and the Trustees, a section of bank in Removal Areas 8 and 9B was observed to have eroded. The original design for the restoration of this area included a flat shelf that extended 30 feet into the river at the anticipated prism-out median flow water elevation. This shelf was to be seeded if exposed, or planted with plugs if frequently inundated. After completion of the restoration of the bank in fall 2008, water levels were too high for seeding or installation of erosion control fabric; therefore, the protection and vegetation of the shelf was deferred until the following spring. During the severe storm flows that occurred in September 2008 and the winter and spring of 2009, the majority of the shelf eroded away before protective vegetation and erosion control fabric could be installed. As a result, much of the 30-foot buffer between the river and the bank eroded. The proposed design for the repair of the bank utilizing rock armament has been submitted to USEPA and the Trustees and will be implemented in 2009 following approval. A permanent transect will be established in the repair area after the bank is repaired so the bank can be monitored in future monitoring events for changes. No other bank areas were identified as requiring maintenance or repair activities.

The regrading of the north bank in the vicinity of the gas pipeline that was being completed during bank inspection activities in August 2009 removed the majority of the vegetation that helped to maintain the stability of the bank. Although the exposed soils were well-compacted clay, the restoration of the bank vegetation will reduce the erosion potential of the bank. However, some erosion of this bank would be acceptable as this area creates a transition angle between steeper bank angles to the east and shallower bank angles to the west. This disturbed bank area will be vegetated in fall 2009 as Zone 1, with a wet seed mix and live cuttings installed through a temporary erosion control fabric.

5.3 Adaptive Management

In an adaptive management approach, observations of river tendencies are interpreted to evaluate their significance to the quality of the river and its riparian habitat. Adaptive management will be used in the evaluation of bank and floodplain conditions once the long-term water elevations have become established. Specific attention will be paid to the final water/bank interface where excessive erosion could lead to significant bank failure that would negatively influence the morphology of the river or jeopardize the top-of-bank land use. Adaptive management remedies will be identified (as necessary) to address erosion and improve the overall habitat quality of the river shoreline. Adaptive management options could include the installation of coir logs to protect the banks and increase the vegetative density of

the shoreline. Other measures, such as reseeding or installing plant plugs where seeding was ineffective, or increasing the amount of armor protection will be evaluated on a case-by-case basis and discussed with the appropriate oversight agencies prior to installation.

The adaptive management approach described above would be applied as appropriate when conditions of note are observed to determine what specific response actions will be taken, if any, and the scheduling of such response actions. The results (i.e., final conditions) of any response actions will be documented in writing with photos immediately following implementation. The performance of any such response actions will be documented after a period of 1 year following implementation of the response action or during the next scheduled monitoring event, whichever occurs sooner.

Based on the results of the spring and summer 2009 monitoring events, the need for maintenance activity was identified for the south bank in the vicinity of Removal Areas 8 and 9B. A response action has been proposed for implementation in fall 2009 with the concurrence of USEPA and the Trustees (ARCADIS 2009). The 2010 monitoring report will include a description of the repair. No other maintenance activities were identified during the 2009 monitoring activities. Observed conditions will continue to be monitored in future annual events and the need for maintenance or repair actions will be assessed and implemented, as needed.

6. Future Monitoring and Reporting Activities

Monitoring activities will continue in the project area for 2 years. Based on discussions with USEPA and the Trustees, future bank monitoring activities will consist of the following tasks.

1. Conduct a spring qualitative project area inspection in May/June (when river water levels drop to baseflow conditions) to evaluate tree and shrub survival and to determine if weeds such as reed canary grass or other invasive species are present and require control.
2. Reclassify the erosion hazard index for the restored banks during the spring inspection using Rosgen's (2006) BEHI and compare to the classifications from the previous year to evaluate changes in bank stability.
3. Instrument survey the restored banks at the 11 established transect locations as well as any other areas that were either repaired the previous year or were identified as requiring additional attention during the spring inspection.
4. Provide transect survey data and BEHI results to USEPA and the Trustees in June.
5. Conduct a collaborative inspection of the banks and restored habitats with USEPA and the Trustees in mid-summer (July/August) and identify any areas requiring corrective action.
6. Submit a design for any potential corrective action to USEPA and the Trustees for review and comment.
7. Implement the corrective action as appropriate.
8. Perform the summer quantitative vegetation evaluation to determine percent cover and diversity metrics.
9. Submit the annual monitoring report to USEPA and the Trustees.

This process will allow USEPA and the Trustees to review information about the restored banks and habitats early enough in the year so that any issues identified during the collaborative project area inspection could be designed and implemented in the same year as the monitoring is being performed. Future annual monitoring reports will include the results of the entire year's monitoring efforts as well as descriptions of the corrective actions that were implemented prior to preparation of the monitoring report for that year.

7. References

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ARCADIS

Tables

Kalamazoo River Study Group
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Former Plainwell Impoundment TCRA
Former Plainwell Impoundment 2009 Bank Conditions Monitoring Report

Table 1 - Bank Erosion Hazard Index Parameter Summary

Category		Bank Height Ratio (ft/ft)	Root Depth Ratio (%)	Root Density (%)	Bank Angle (°)	Surface Protection (%)	Total Index
Very Low	Value	1.0-1.1	100-90	100-80	0-20	100-80	
	Index	1-1.9	1-1.9	1-1.9	1-1.9	1-1.9	5-9.5
Low	Value	1.11-1.19	89-50	79-55	21-60	79-55	
	Index	2-3.9	2-3.9	2-3.9	2-3.9	2-3.9	10-19.5
Moderate	Value	1.2-1.5	49-30	54-30	61-80	54-30	
	Index	4-5.9	4-5.9	4-5.9	4-5.9	4-5.9	20-29.5
High	Value	1.6-2	29-15	29-15	81-90	29-15	
	Index	6-7.9	6-7.9	6-7.9	6-7.9	6-7.9	30-39.5
Very High	Value	2.1-2.8	14-5	14-5	91-119	14-10	
	Index	8-9	8-9	8-9	8-9	8-9	40-45
Extreme	Value	>2.8	<5	<5	>119	<10	
	Index	10	10	10	10	10	46-50

Numerical Adjustments:

Bedrock:	BEHI Very Low
Boulders:	BEHI Low
Cobble:	Decrease by one category if gravel/sand less than 50%
Gravel:	Adjust Index up 5-10 points depending on sand %
Sand:	Adjust Index up 10 points
Silt/clay:	No adjustment
Stratification:	Adjust Index up 5-10 points depending on position of unstable layers in relation to bankfull stage

Source: Rosgen (2006)

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 Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
 Former Plainwell Impoundment TCRA
 Former Plainwell Impoundment 2009 Bank Conditions Monitoring Report

Table 2 - Bank Erosion Hazard Index Results

Location	Bank Height (ft) ¹	Bankfull Height (ft) ¹	Bank Height/ Bankfull Height	Bank Height/ Bankfull Height Value	Root Depth (in)	Root Depth/ Bank Height Value	Root Density (%)	Root Density Value	Bank Angle (degrees)	Bank Angle Value	Surface Protection (%)	Surface Protection Value	Modifying Points	Total Score	Erosion Potential
Area A1	=	=	1.0	1	2	6	50	4	20	2	70	2	5	20	Moderate
Area A2	=	=	1.0	1	8	4	50	4	13	1	50	6	10	26	Moderate
Area B1	=	=	1.0	1	3	6	100	1	6	1	100	1	5	15	Low
Area C1	=	=	1.0	1	3	6	70	2	5	1	70	2	0	12	Low
Area D1	=	=	1.0	1	6	5	100	1	9	1	100	1	0	9	Very Low
Area E1	6.1	4.8	1.3	5	0	10	0	10	16	2	0	10	0	37	High
Area F1	8.2	5.7	1.4	5	6	5	100	1	23	2	100	1	0	14	Low
Area G1	11.3	6.0	1.9	8	6	5	90	1	21	2	90	1	5	22	Moderate
Area H1	12.9	7.7	1.7	6	6	5	50	4	23	2	100	1	-10	8	Very Low
Area H2	=	=	1.0	1	6	5	50	4	9	1	100	1	-10	2	Very Low
Area I1	=	=	1.0	1	6	5	90	1	10	1	90	1	5	14	Low
Area I2	=	=	1.0	1	6	5	100	1	3	1	100	1	0	9	Very Low
Area J1	=	=	1.0	1	13	4	60	2	112	9	60	4	0	20	Moderate
Area J2	=	=	1.0	1	6	5	20	7	69	5	10	9	0	27	Moderate
Area K1	6.3	3.9	1.6	6	6	5	70	2	19	2	70	2	0	17	Low
Area L1	=	=	1.0	1	6	5	60	2	0	1	60	4	0	13	Low
Area M1	=	=	1.0	1	6	5	100	1	3	1	100	1	10	19	Low
Area N1	=	=	1.0	10	6	5	20	7	83	6	10	9	0	37	High
Area O1	8.3	2.3	3.6	10	6	5	90	1	19	2	100	1	0	19	Low
Area O2	5.5	1.2	4.6	10	6	5	70	2	3	1	100	1	0	19	Low
Area O3	15.5	6.9	2.3	8	6	5	60	2	19	2	100	1	0	18	Low
Area O4	10.9	5.2	2.1	8	6	5	20	7	15	2	100	1	-10	13	Low

Notes:

1- "=" indicates that the bank height and the bankfull height were equal.

Kalamazoo River Study Group
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
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Former Plainwell Impoundment 2009 Bank Conditions Monitoring Report

Table 3 - 2009 Woody Vegetation Stem Count Summary

Removal Area	Number of Plants Planted	Number of Plants Observed	Original Planted Stem Density (%)
1	244	151	62
2A	100	92	92
3A	190	181	95
3B	90	87	97
4A	100	99	99
4B	163	33	20
Island Zone 3	78	0	0
5	40	32	80
6A	114	90	79
6B	150	125	83
6B1 (+ Area N)	200	162	81
7	50	38	76
8	30	12	40
9A	85	76	89
9B	50	36	72
10A	70	56	80
10B	165	135	82
11A	146	124	85
11B	90	76	84
12A	220	201	91
12 1A	330	111	34
13A	505	505	100
13B	600	600	100
Total	3810	3022	0.79

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Table 4 - Herbaceous Vegetation Monitoring Summary

Removal Area	Percent Ground Cover	Percent Weed Cover
1	99	0.4
2A	100	1.7
Island 3	98	7.5
3A	100	14.0
3B	100	0.6
4A	99	0.0
4B	100	0.0
5	95	0.0
6B	88	4.0
7	98	<5
8	100	2.5
9A	99	0.0
9B	97	0.0
10A	95	0.0
10B	98	4.5
11A	97	3.3
12A	100	0.7
12B	100	0.0
13A	78	0.6
13B	95	0.0
Average	97	2

ARCADIS

Figures

CITY: SYRACUS DIV/GRP: 141/ENV DB: KLS PW: SDG LYR: ON=OFF=REF
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REFERENCE: USGS QUADS., 7.5 MIN. SERIES, DRG TOPOGRAPHIC MAP - ALLEGAN COUNTY, KALAMAZOO MICHIGAN.

0 2000' 4000'
 Approximate Scale: 1" = 2000'

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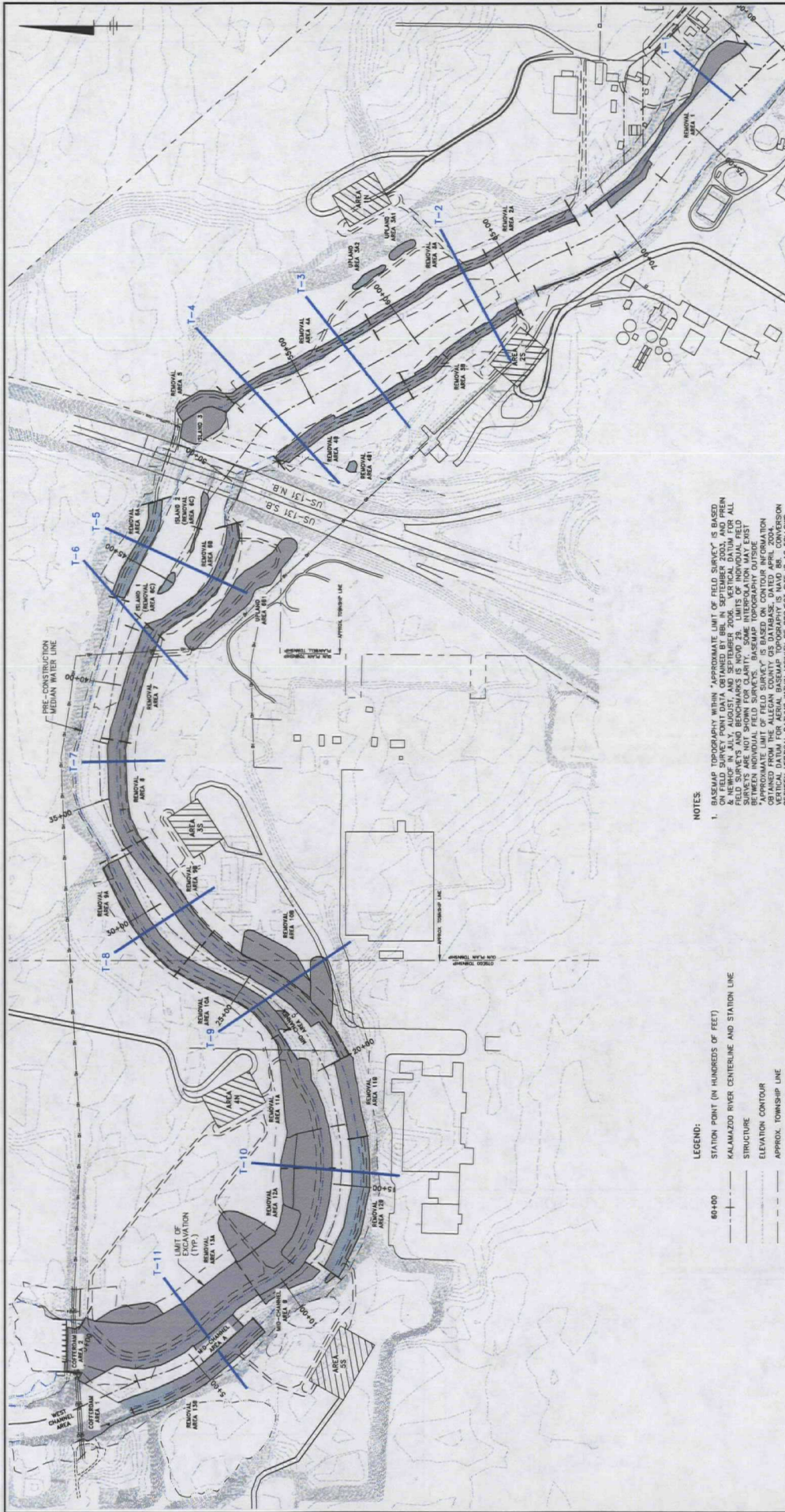
KALAMAZOO RIVER STUDY GROUP
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 KALAMAZOO RIVER SUPERFUND SITE
 FORMER PLAINWELL IMPOUNDMENT
 2009 BANK CONDITIONS MONITORING REPORT

SITE LOCATION MAP



FIGURE

1



- NOTES**
1. BASEMAP TOPOGRAPHY WITHIN "APPROXIMATE LIMIT OF FIELD SURVEY" IS BASED ON FIELD SURVEY POINT DATA OBTAINED BY BBL IN SEPTEMBER 2003. ALL FIELD SURVEYS AND BENCHMARKS ARE HAD 25.4 FEET LIMITS OF INDIVIDUAL FIELD SURVEYS ARE NOT SHOWN FOR CLARITY. BASEMAP TOPOGRAPHY WITHIN "APPROXIMATE LIMIT OF FIELD SURVEY" IS BASED ON CONTOUR INFORMATION OBTAINED FROM AERIAL PHOTOGRAPHY. CONTOUR INFORMATION IS BASED ON VERTICAL DATUM FOR AERIAL PHOTOGRAPHY TOPOGRAPHY IS HAD 85. CONVERSION BETWEEN VERTICAL DATUMS WITHIN VICINITY OF PROJECT SITE IS AS FOLLOWS: HORIZONTAL DATUM FOR ALL SURVEY INFORMATION (I.E. FIELD AND AERIAL) IS STATE PLANE, NAD 83, MICHIGAN SOUTH ZONE (2113). INTERNATIONAL FEET IS AVAILABLE PLANS, RECORDS AND SURVEYS, AND, THEREFORE, THEIR LOCATIONS, MATERIALS, AND TYPE OF USE MUST BE CONSIDERED APPROXIMATE ONLY.
 2. EXISTING FACILITIES, STRUCTURES, AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE PLANS, RECORDS AND SURVEYS, AND, THEREFORE, THEIR LOCATIONS, MATERIALS, AND TYPE OF USE MUST BE CONSIDERED APPROXIMATE ONLY.

- LEGEND:**
- 60+00 STATION POINT (IN HUNDREDS OF FEET)
 - KALAMAZOO RIVER CENTERLINE AND STATION LINE
 - STRUCTURE
 - ELEVATION CONTOUR
 - APPROX. TOWNSHIP LINE
 - PRE-CONSTRUCTION DAM-IN-MEDIAN WATER LINE (APPROX.)
 - APPROX. LIMIT OF FIELD SURVEY
 - OFF-ROAD ACCESS ROUTE
 - GRAVEL ACCESS ROAD
 - STAGING AREA
 - EXCAVATION AREA
 - MONITORING TRANSECT LOCATION AND ID

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2009 BANK CONDITIONS MONITORING REPORT

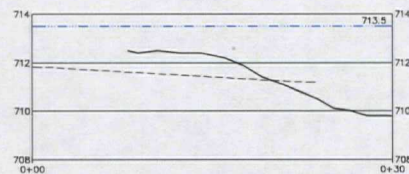
RIVER BANK MONITORING
TRANSECT LOCATIONS

FIGURE
2

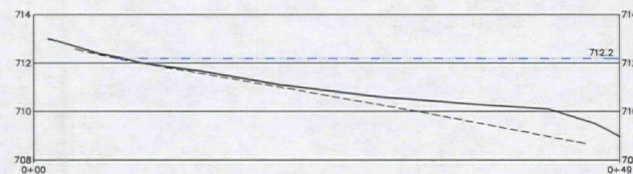


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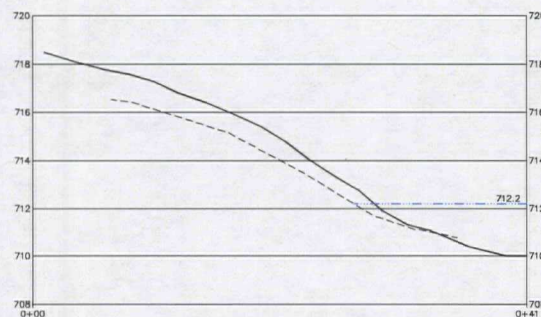
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GRAPHIC SCALE



T-1 NORTH BANK
SCALE AS NOTED



T-2 NORTH BANK
SCALE AS NOTED



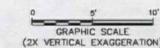
T-2 SOUTH BANK
SCALE AS NOTED

LEGEND:

- POST-CONSTRUCTION SURVEYED GRADE
 — 2009 SURVEYED GRADE
 PRISM-OUT 2-YEAR WATER LINE

NOTE:

1. WATER ELEVATION SHOWN INDICATES PRISM-OUT 2-YEAR FLOW ELEVATION.



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MONITORING TRANSECT CROSS SECTIONS - T-1 AND T-2



FIGURE
3

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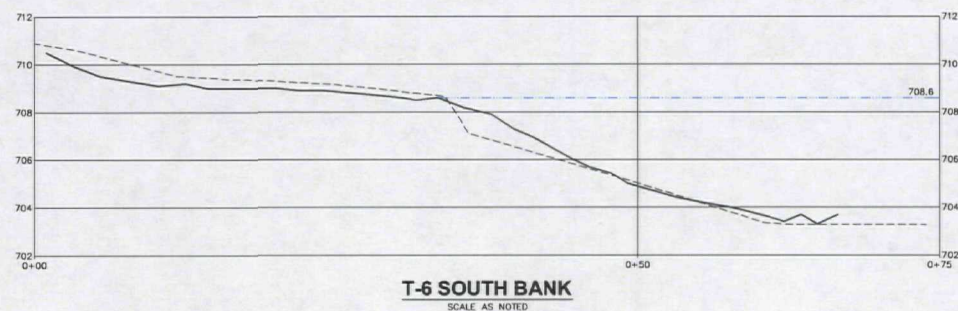
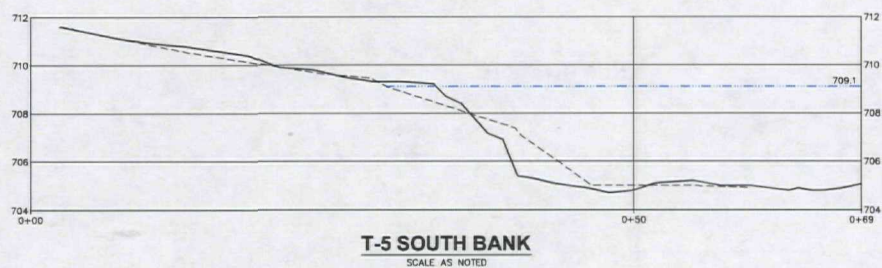
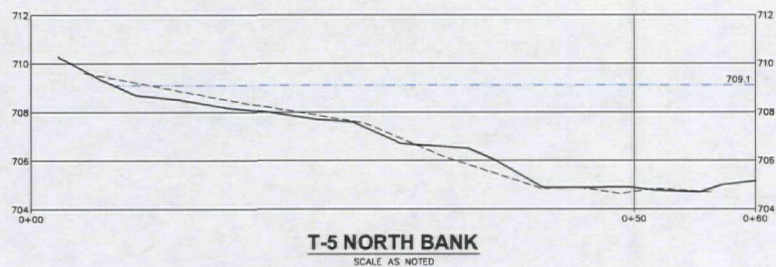
- - - - - POST-CONSTRUCTION SURVEYED GRADE
 _____ 2009 SURVEYED GRADE
 - - - - - PRISM-OUT 2-YEAR WATER LINE

1. WATER ELEVATION SHOWN INDICATES PRISM-OUT 2-YEAR FLOW ELEVATION.

MONITORING TRANSECT CROSS SECTIONS - T-3 AND T-4



FIGURE 4

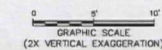


LEGEND:

- - - - - POST-CONSTRUCTION SURVEYED GRADE
 ——— 2009 SURVEYED GRADE
 - - - - - PRISM--OUT 2-YEAR WATER LINE

NOTE:

1. WATER ELEVATION SHOWN INDICATES PRISM-OUT 2-YEAR FLOW ELEVATION.



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2009 BANK CONDITIONS MONITORING REPORT

MONITORING TRANSECT CROSS SECTIONS - T-5 AND T-6



FIGURE
5

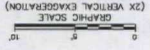
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FIGURE 6

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 2009 BANK CONDITIONS MONITORING REPORT
 CROSS SECTIONS - T-7

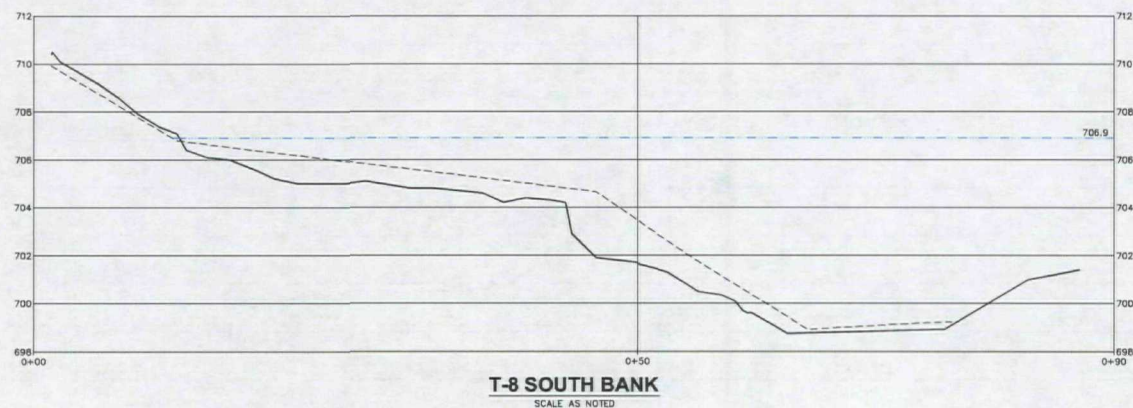
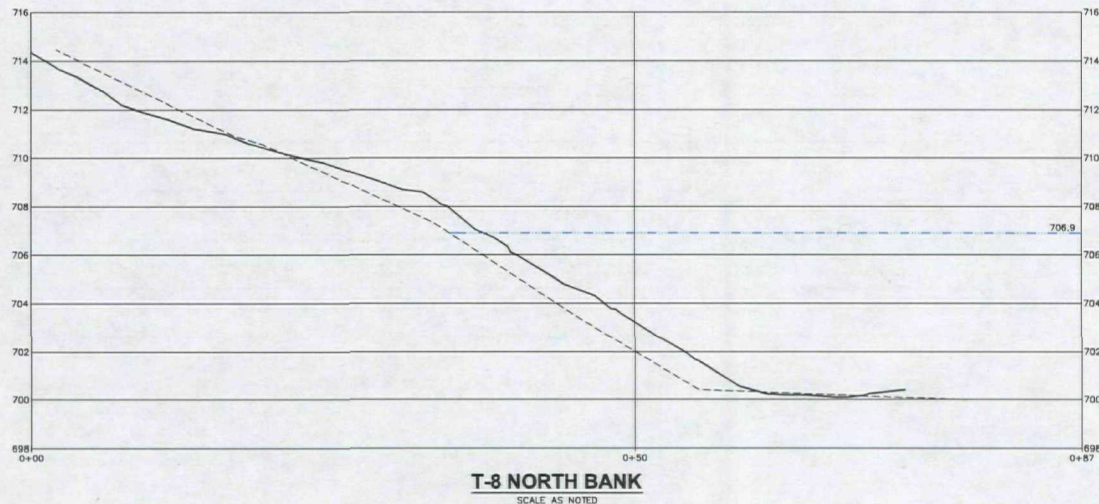


NOTE:
 1. WATER ELEVATION SHOWN INDICATES PRISM-OUT 2-YEAR
 FLOW ELEVATION.

LEGEND:
 --- POST-CONSTRUCTION SURVEYED GRADE
 — 2009 SURVEYED GRADE
 --- PRISM-OUT 2-YEAR WATER LINE



CITY OF KALAMAZOO, DIVISION OF ENVIRONMENTAL SERVICES, 1000 WEST MAIN STREET, KALAMAZOO, MI 49001-3800
 PROJECT NAME: KALAMAZOO RIVER SUPERFUND SITE, PORTAGE CREEK, FORMER PLAINWELL IMPOUNDMENT
 DRAWING: 2009 BANK CONDITIONS MONITORING REPORT, MONITORING TRANSECT CROSS SECTIONS - T-8
 DATE: 10/1/2009
 BY: SANDOR ALEX



LEGEND:
 - - - - - POST-CONSTRUCTION SURVEYED GRADE
 _____ 2009 SURVEYED GRADE
 PRISM-OUT 2-YEAR WATER LINE

NOTE:
 1. WATER ELEVATION SHOWN INDICATES PRISM-OUT 2-YEAR FLOW ELEVATION.

0 5' 10'
 GRAPHIC SCALE
 (2X VERTICAL EXAGGERATION)

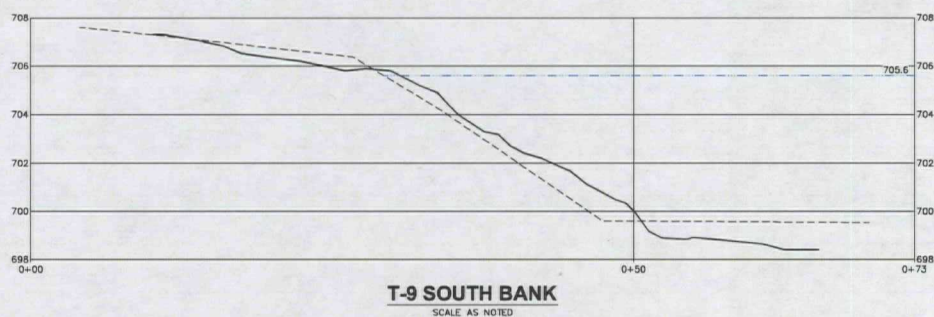
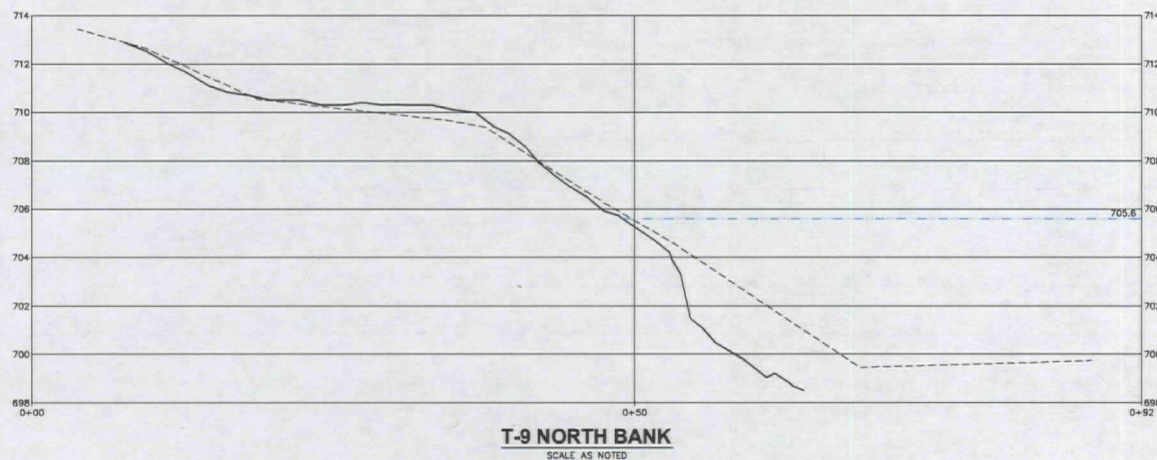
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**MONITORING TRANSECT
 CROSS SECTIONS - T-8**



FIGURE
7

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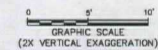


LEGEND:

- POST-CONSTRUCTION SURVEYED GRADE
 ——— 2009 SURVEYED GRADE
 - - - - - PRISM-CUT 2-YEAR WATER LINE

NOTE:

1. WATER ELEVATION SHOWN INDICATES PRISM-OUT 2-YEAR FLOW ELEVATION.



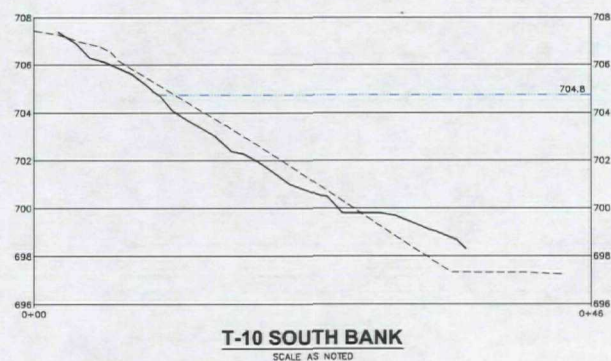
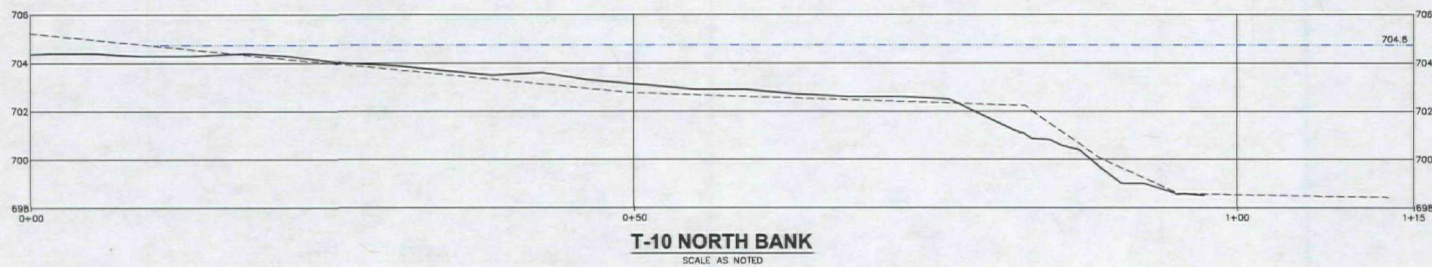
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FORMER PLAINWELL IMPOUNDMENT
2009 BANK CONDITIONS MONITORING REPORT

**MONITORING TRANSECT
CROSS SECTIONS - T-9**



FIGURE 8

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LEGEND:

- POST-CONSTRUCTION SURVEYED GRADE
 ————— 2009 SURVEYED GRADE
 - - - - - PRISM-OUT 2-YEAR WATER LINE

NOTE:

1. WATER ELEVATION SHOWN INDICATES PRISM-OUT 2-YEAR FLOW ELEVATION.

0 5' 10'

GRAPHIC SCALE
(2X VERTICAL EXAGGERATION)

KALAMAZOO RIVER STUDY GROUP
ALLIED PAPER INC./PORTAGE CREEK/
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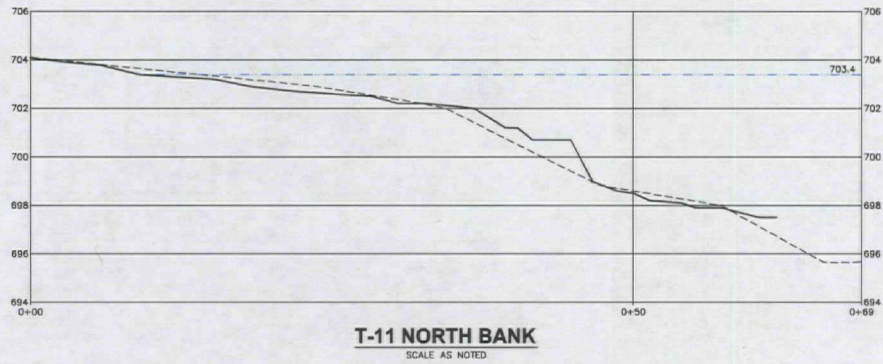
MONITORING TRANSECT CROSS SECTIONS - T-10



FIGURE 9

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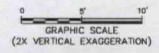
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 USER: JEFFREY
 PROJECT: KALAMAZOO RIVER SUPERFUND SITE
 DRAWING: MONITORING TRANSECT CROSS SECTIONS - T-11
 LAYOUT: T-11_NORTH_BANK
 PLOTTER: HP DesignJet 1200
 PLOTTED: 10/20/2009 10:58 AM
 BY: JEFFREY



- LEGEND:**
- POST-CONSTRUCTION SURVEYED GRADE
 - 2009 SURVEYED GRADE
 - ... PRISM-OUT 2-YEAR WATER LINE

NOTE:

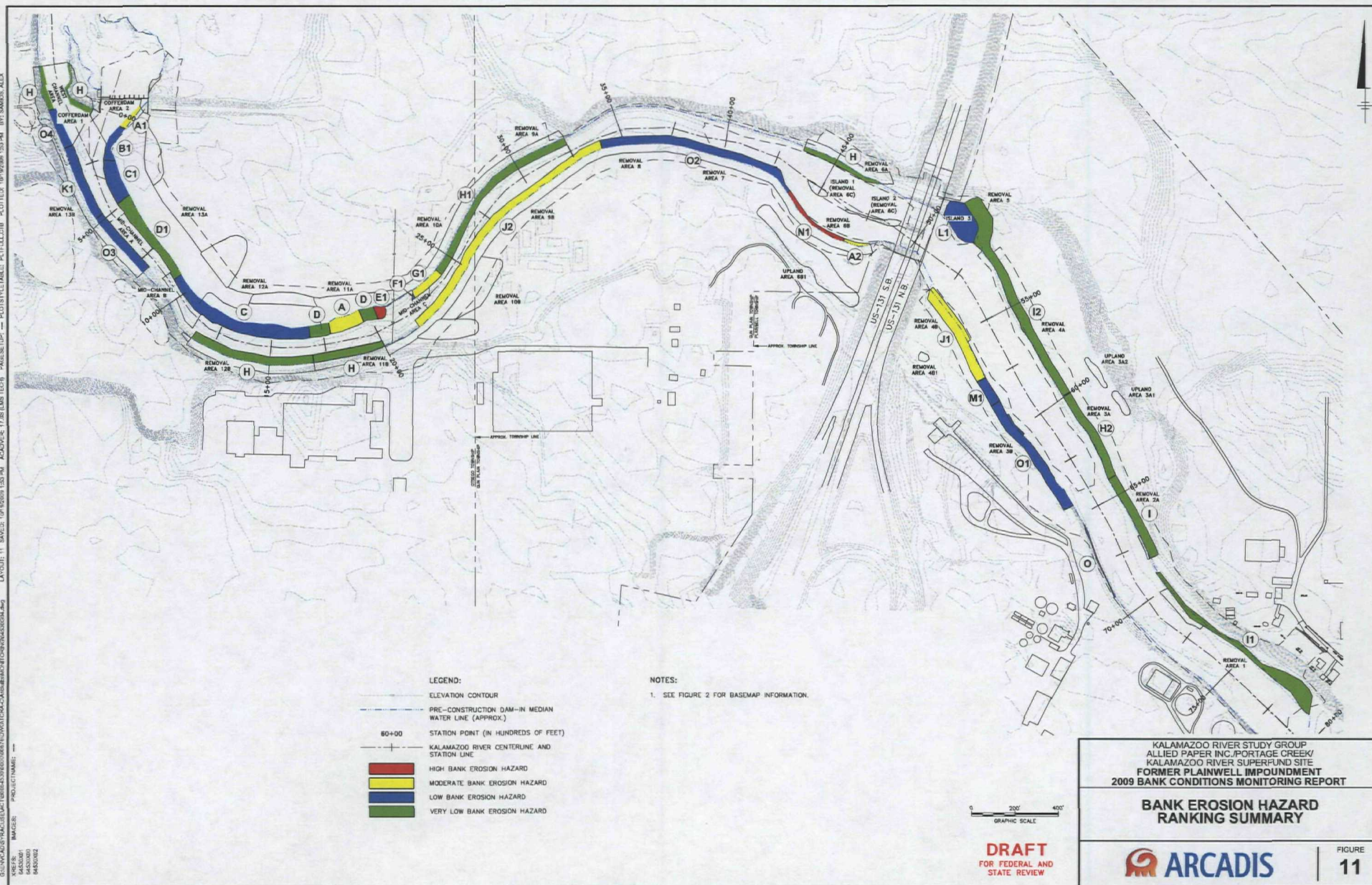
1. WATER ELEVATION SHOWN INDICATES PRISM-OUT 2-YEAR FLOW ELEVATION.



KALAMAZOO RIVER STUDY GROUP ALLIED PAPER INC./PORTAGE CREEK/ KALAMAZOO RIVER SUPERFUND SITE FORMER PLAINWELL IMPOUNDMENT 2009 BANK CONDITIONS MONITORING REPORT	
MONITORING TRANSECT CROSS SECTIONS - T-11	
	FIGURE 10

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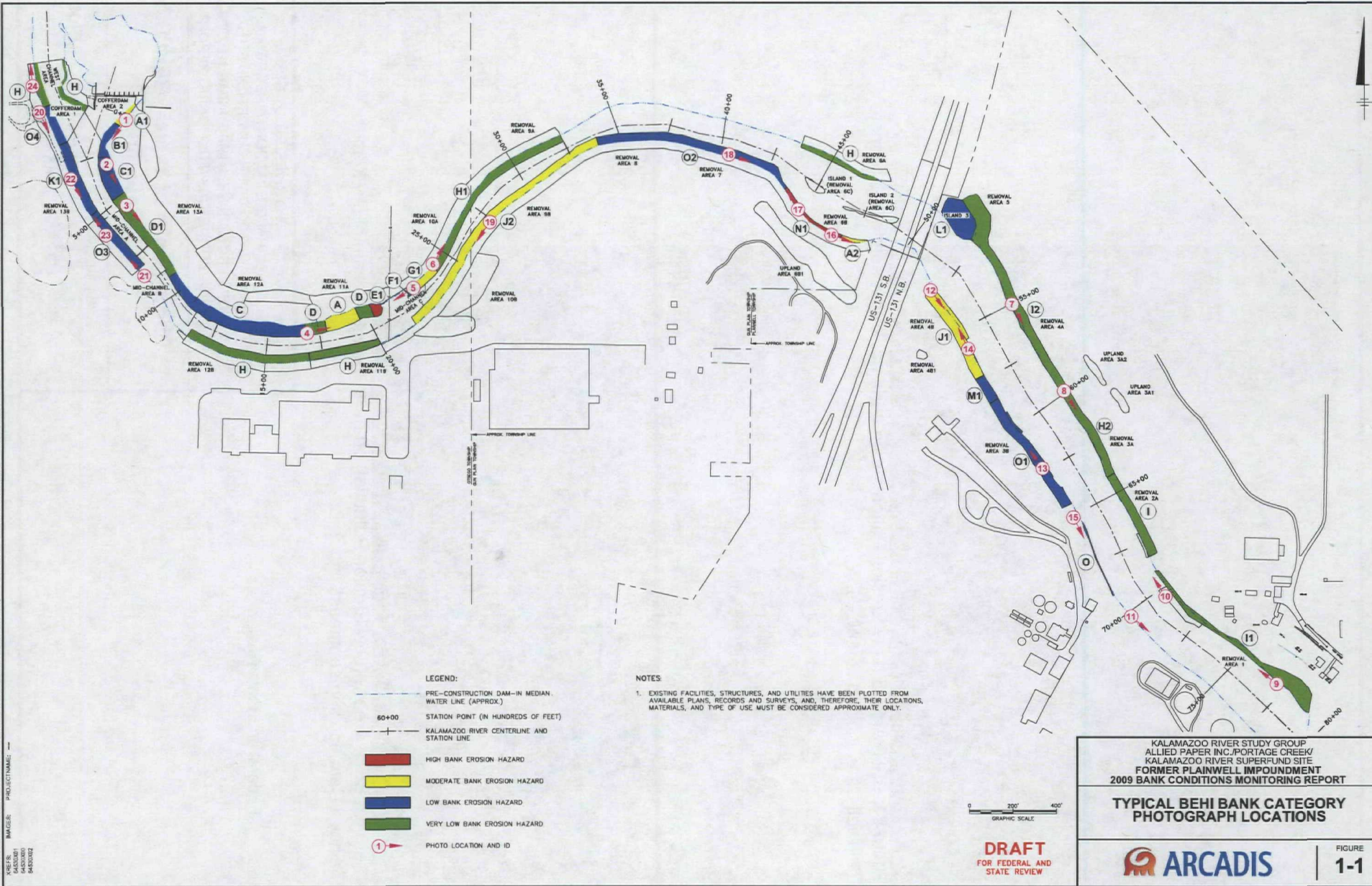
CITY: Kalamazoo, DIVISION: ENVIRONMENTAL, DRAWING: PL011421B, LAYOUT: 11, SCALE: 1"=100' (1:1200), DATE: 11/15/2009, BY: SAKURA ALBA
 PROJECT NAME: Kalamazoo River Study Group, Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site, Former Plainwell Impoundment, 2009 Bank Conditions Monitoring Report
 DRAWING: PL011421B, LAYOUT: 11, SCALE: 1"=100' (1:1200), DATE: 11/15/2009, BY: SAKURA ALBA



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Attachment 1

Photographs of Typical BEHI
Bank Categories





1

Photo #1: BEHI Area B (Low Erosion Potential) on north bank upstream of the former Plainwell Dam, looking southeast.



2

Photo #2: BEHI Area C (Low Erosion Potential) on north bank upstream of the former Plainwell Dam, looking southeast.

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Photographs of Typical BEHI Bank Categories



Figure
1-2



3

Photo #3: BEHI Area D (Very Low Erosion Potential) on north bank upstream of the former Plainwell Dam, looking southeast.



4

Photo #4: BEHI Area D (Very Low Erosion Potential) on north bank upstream of the former Plainwell Dam, looking east.

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Photographs of Typical BEHI Bank Categories

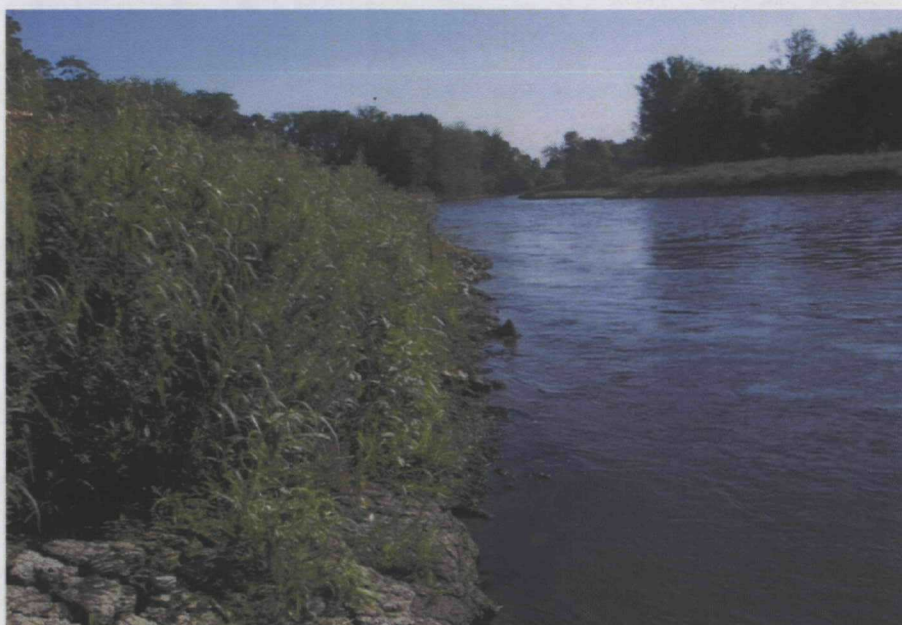


Figure
1-3



5

Photo #5: BEHI Area E (High Erosion Potential) on north bank at the regraded gas pipeline, looking southwest.



6

Photo #6: BEHI Area G (Moderate Erosion Potential) on north bank upstream of the gas pipeline, looking east.

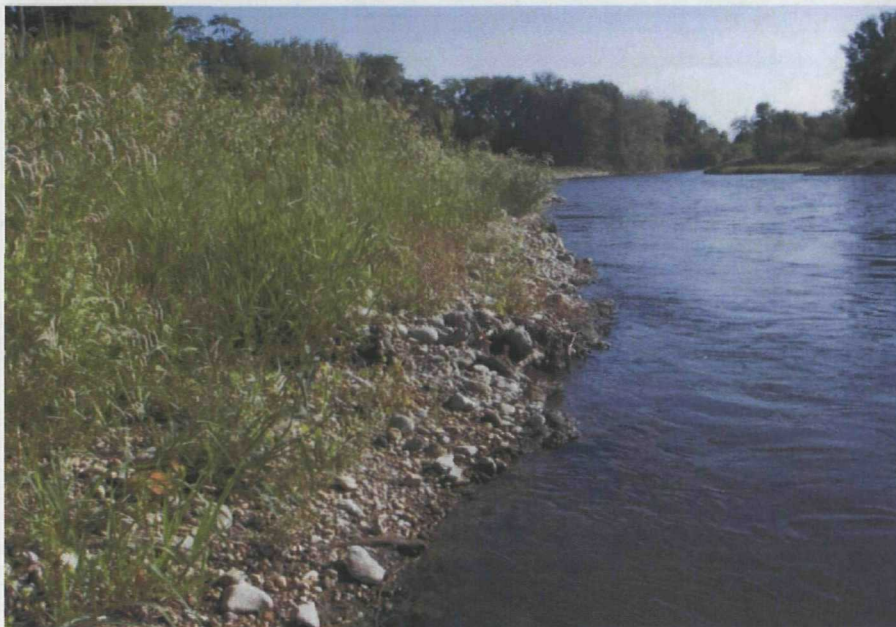
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Photographs of Typical BEHI Bank Categories

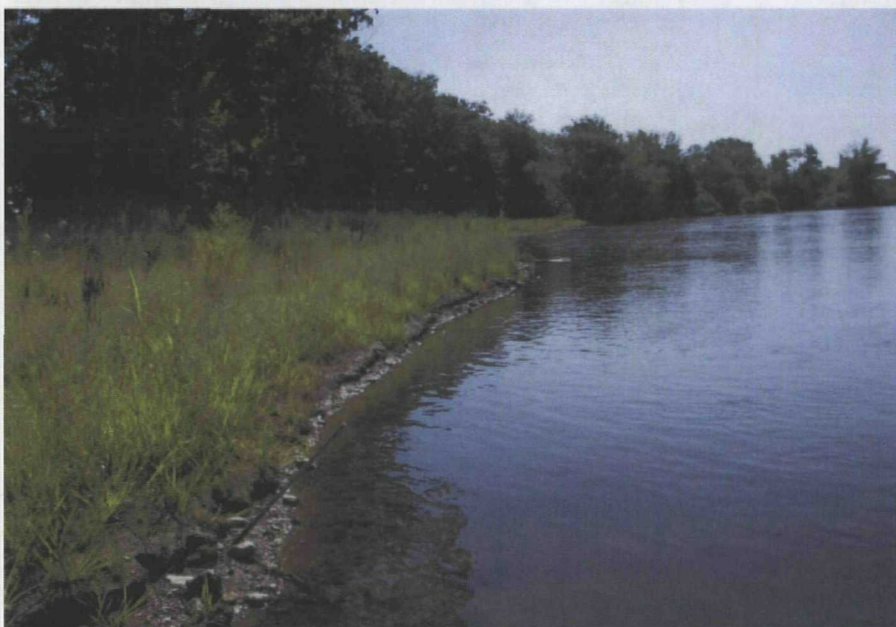


Figure
1-4



7

Photo #7: BEHI Area I (Very Low Erosion Potential) on north bank upstream of the US-131 bridge, looking east.



8

Photo #8: BEHI Area H (Very Low Erosion Potential) on north bank upstream of the US-131 bridge, looking east.

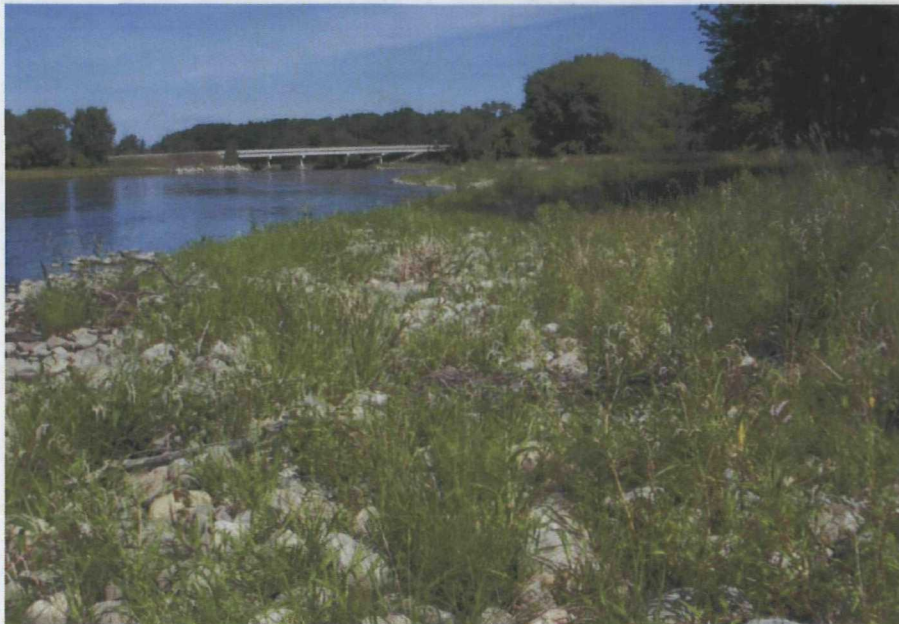
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Photographs of Typical BEHI Bank
Categories

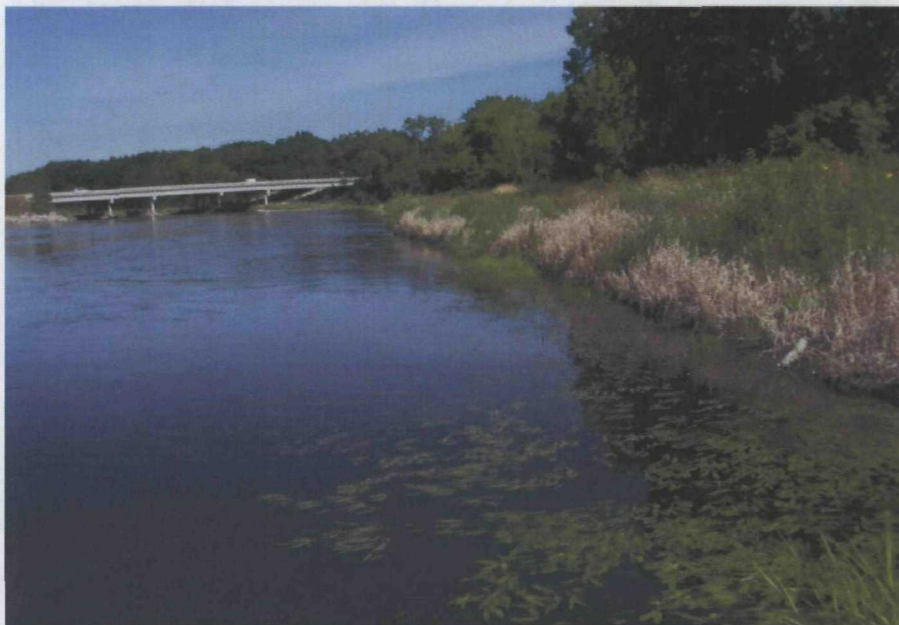


Figure
1-5



9

Photo #9: BEHI Area I (Very Low Erosion Potential) on north bank upstream of the US-131 bridge, looking west.



10

Photo #10: BEHI Area I (Very Low Erosion Potential) on north bank upstream of the US-131 bridge, looking west.

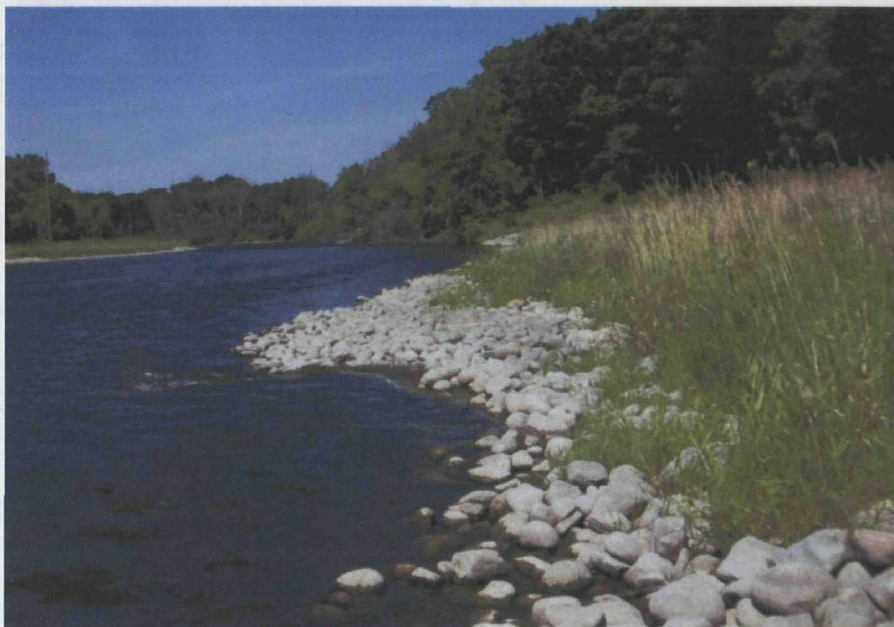
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Photographs of Typical BEHI Bank
Categories



Figure
1-6



11

Photo #11: BEHI Area O (Low Erosion Potential) on south bank upstream of the US-131 bridge, looking east



12

Photo #12: BEHI Area J (Moderate Erosion Potential) on south bank upstream of the US-131 bridge, looking east

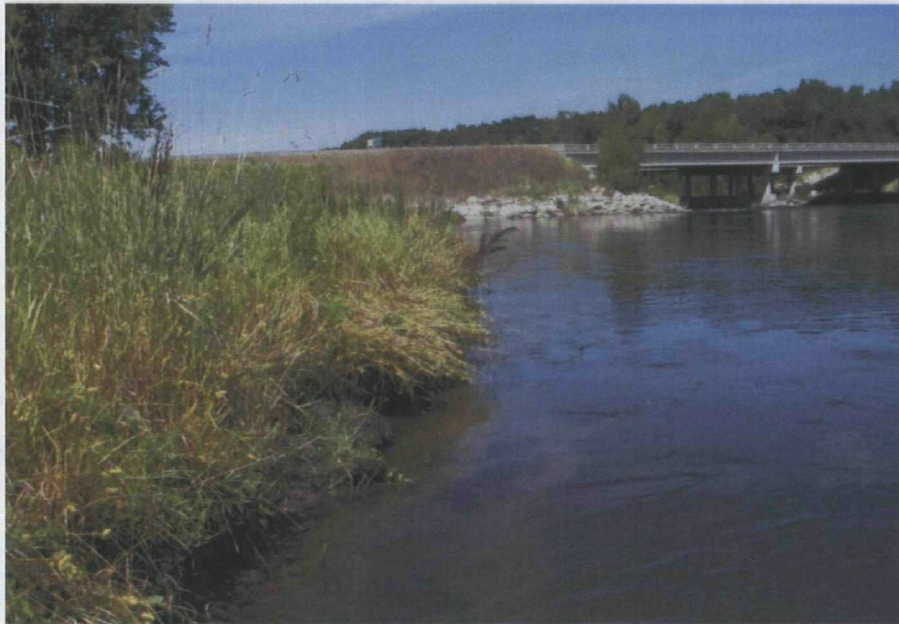
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Categories



Figure
1-7



13

Photo #13: BEHI Area O (Low Erosion Potential) on south bank upstream of the US-131 bridge, looking west.



14

Photo #14: BEHI Area J (Moderate Erosion Potential) on south bank upstream of the US-131 bridge, looking west.

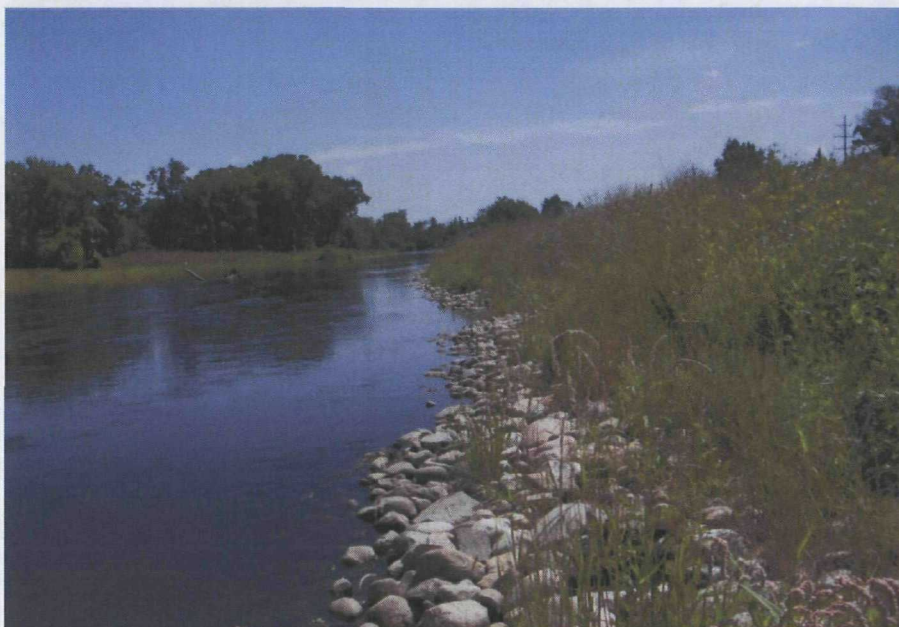
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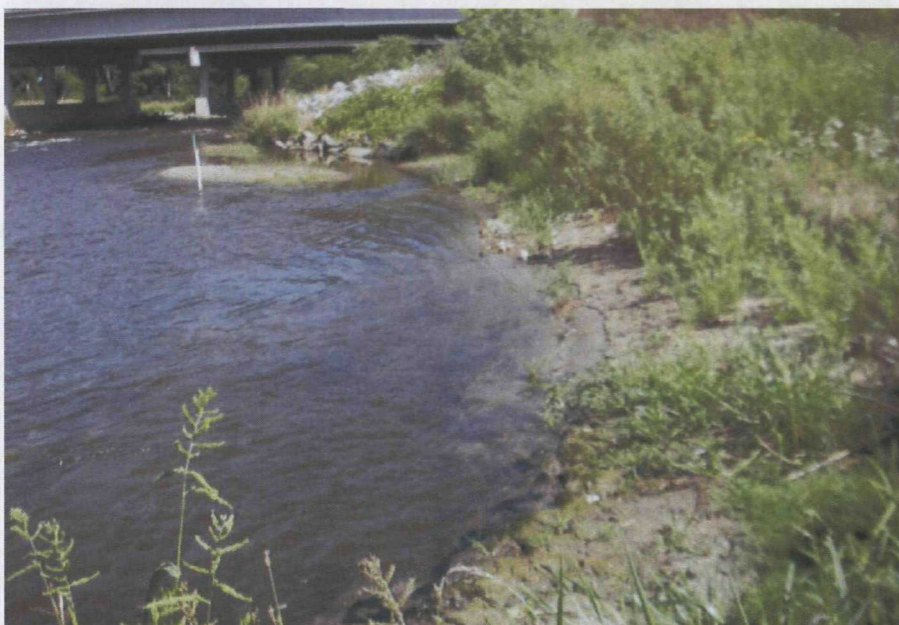


Figure
1-8



15

Photo #15: BEHI Area O (Low Erosion Potential) on south bank upstream of the US-131 bridge, looking east.



16

Photo #16: BEHI Area A (Moderate Erosion Potential) on south bank downstream of the US-131 bridge, looking east.

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Photographs of Typical BEHI Bank Categories

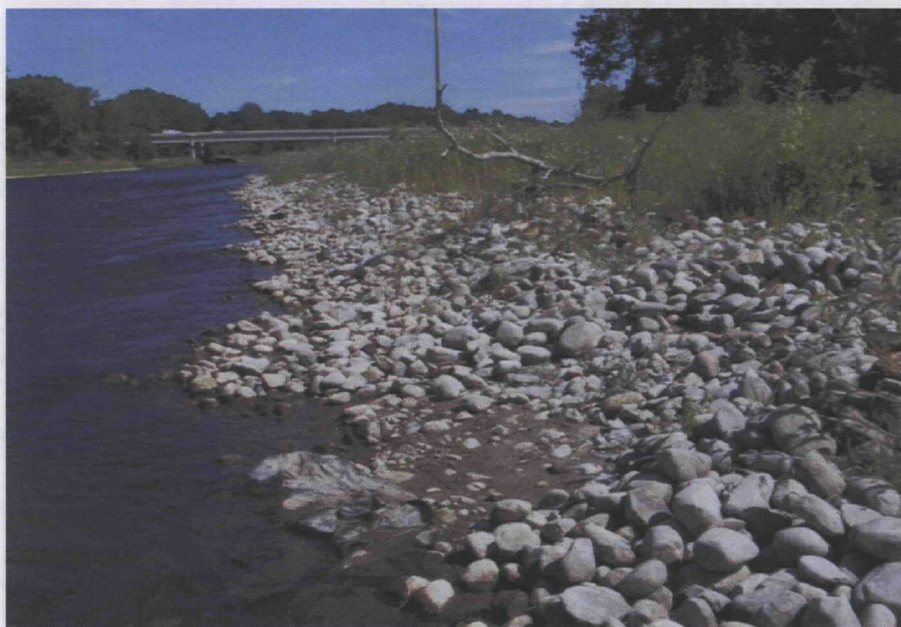


Figure
1-9



17

Photo #17: BEHI Area N (High Erosion Potential) on south bank downstream of the US-131 bridge, looking west.



18

Photo #18: BEHI Area O (Low Erosion Potential) on south bank downstream of the US-131 bridge, looking east.

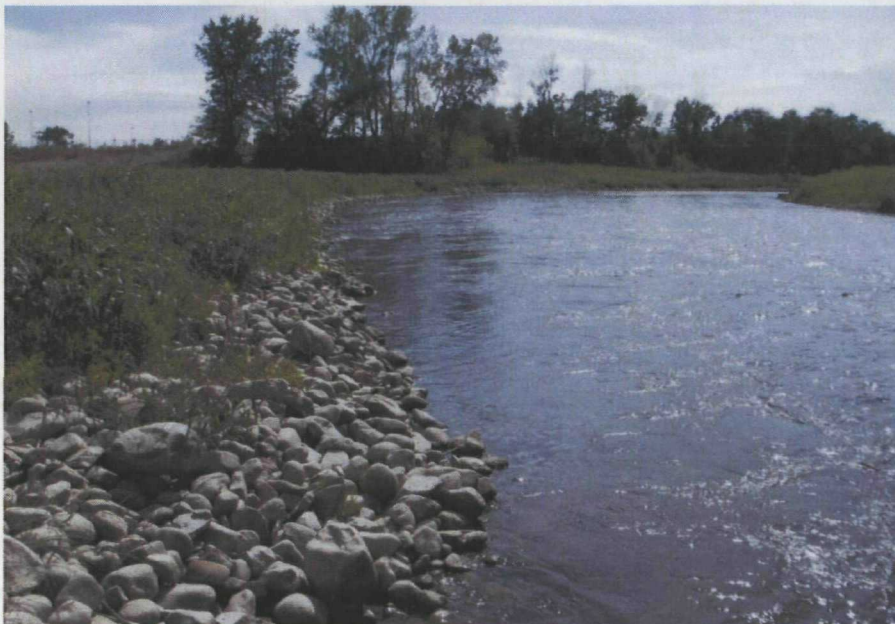
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Photographs of Typical BEHI Bank Categories



Figure
1-10



19

Photo #19: BEHI Area J (Moderate Erosion Potential) on south bank downstream of the US-131 bridge, looking west.



20

Photo #20: BEHI Area O (Low Erosion Potential) on south bank upstream of the former Plainwell Dam, looking east.

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Photographs of Typical BEHI Bank Categories

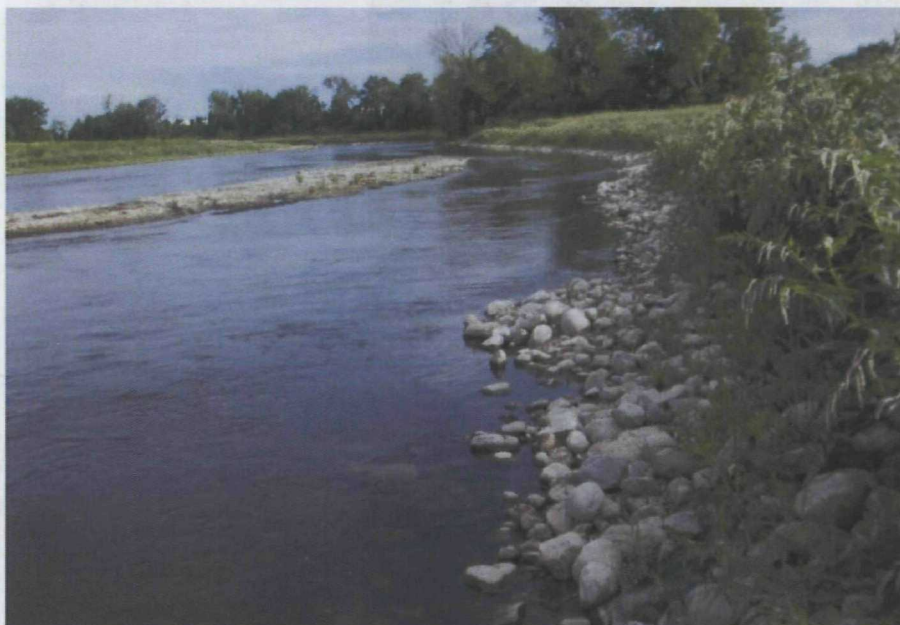


Figure
1-11



21

Photo #21: BEHI Area O (Low Erosion Potential) on south bank upstream of the former Plainwell Dam, looking west.



22

Photo #22: BEHI Area K (Low Erosion Potential) on south bank upstream of the former Plainwell Dam, looking east.

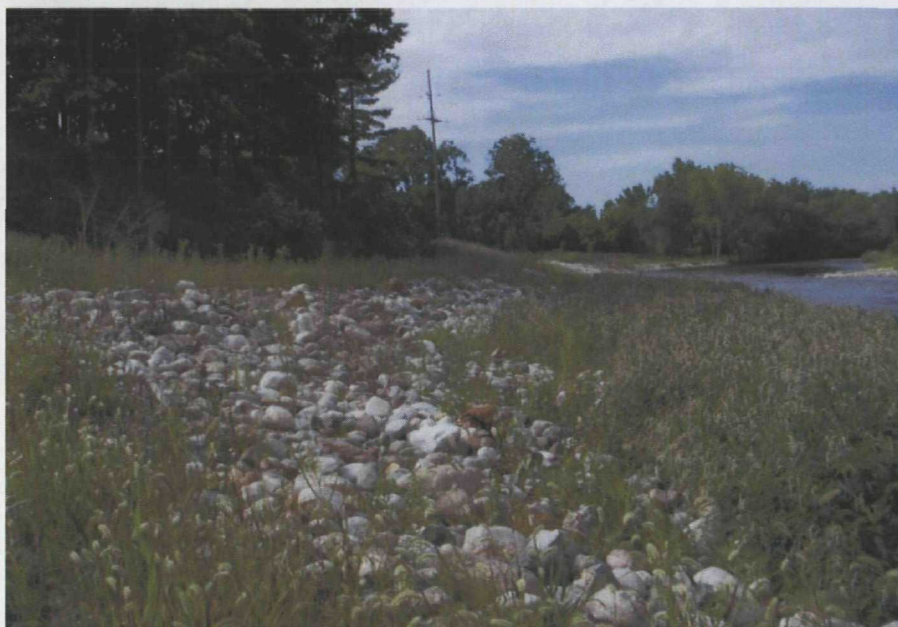
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Photographs of Typical BEHI Bank Categories

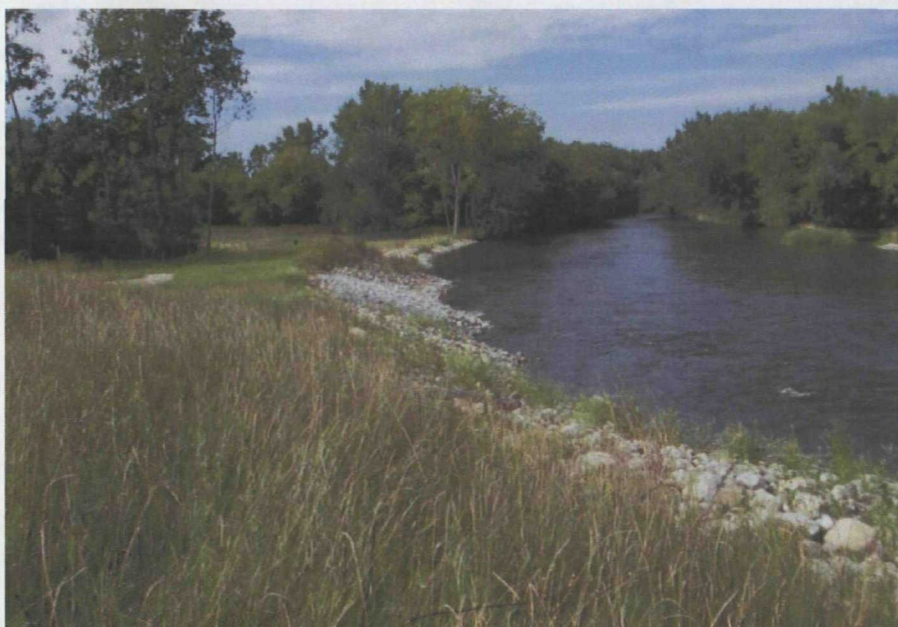


Figure
1-12



23

Photo #23: BEHI Area K (Low Erosion Potential) on south bank upstream of the former Plainwell Dam, looking west.



24

Photo #24: BEHI Area H (Very Low Erosion Potential) on south bank downstream of the former Plainwell Dam, looking west.

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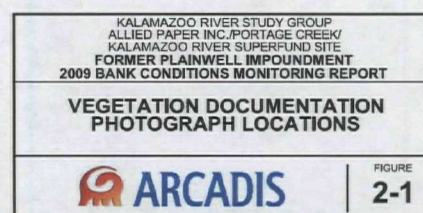


Figure
1-13

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Attachment 2

Vegetation Documentation
Photographs





25

Photo #25: Vegetation of Removal Area 1, looking west from the east end.



26

Photo #26: Vegetation of western portion of Removal Area 2A, looking west from the east end.

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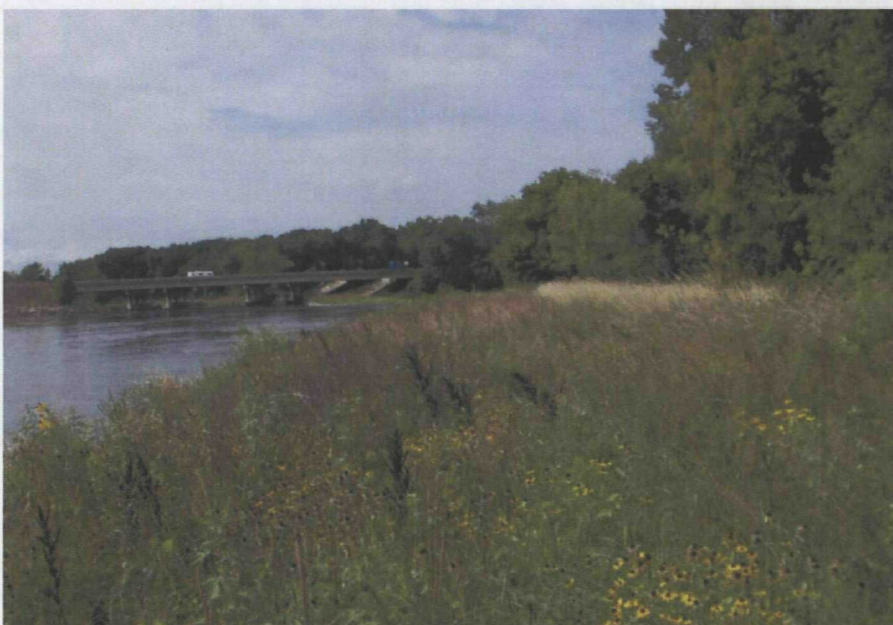


**Figure
2-2**



27

Photo #27: Vegetation of Removal Area 3A, looking west from the east end.



28

Photo #28: Vegetation of Removal Area 4A, looking west from the east end.

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Figure
2-3



29

Photo #29: Vegetation of Island 3, looking west from east end.



30

Photo #30: Vegetation of Removal Area 5, looking north.

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Vegetation Documentation Photographs



Figure
2-4



31

Photo #31: Vegetation of eastern portion of Removal Area 6B, looking east.



32

Photo #32: Vegetation of eastern portion of Removal Area 6B, looking west.

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Figure
2-5



33

Photo #33: Vegetation of western portion of Removal Area 6B, looking west.



34

Photo #34: Vegetation of Removal Area 7, looking west from east end.

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Vegetation Documentation Photographs



Figure
2-6



35

Photo #35: Vegetation of Removal Area 8, looking west from east end.



36

Photo #36: Vegetation of eastern portion of Removal Area 9B, looking east from east end.

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Figure
2-7



37

Photo #37: Vegetation of central portion of Removal Area 9B, looking west.



38

Photo #38: Vegetation of western portion of Removal Area 9B, looking west.

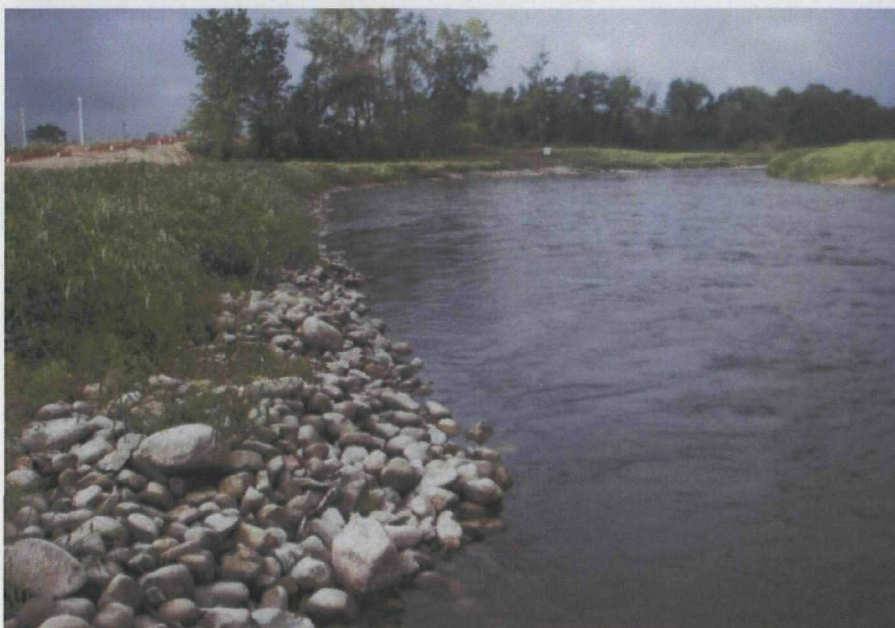
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Figure
2-8



39

Photo #39: Vegetation of eastern portion of Removal Area 10B, looking west from east end.



40

Photo #40: Vegetation of the upland portion of Removal Area 10B, looking northwest from southeast corner.

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Figure
2-9



41

Photo #41: Vegetation of western portion of Removal Area 4B, looking west.



42

Photo #42: Vegetation of western portion of Removal Area 4B, looking east from west end.

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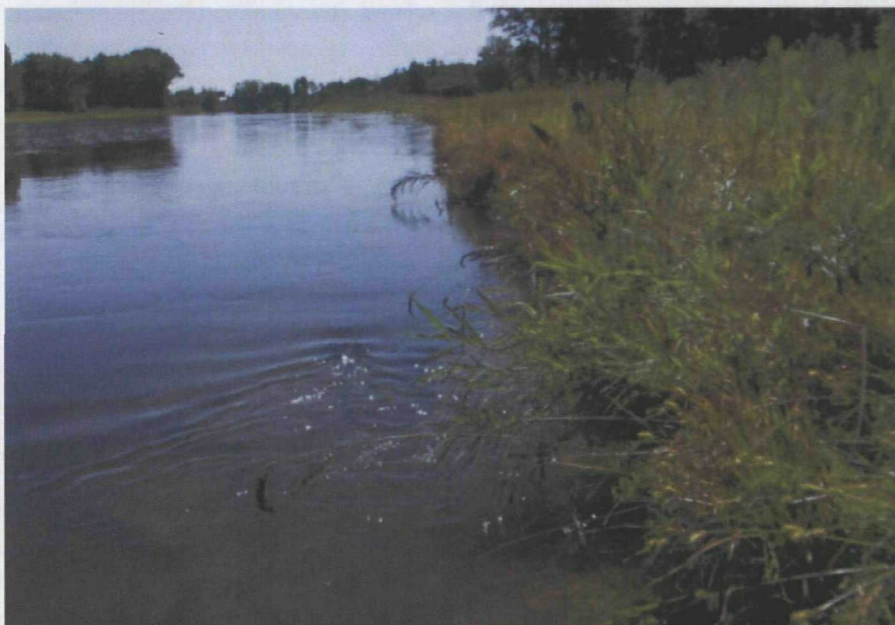


Figure
2-10



43

Photo #43: Vegetation of Removal Area 4B, looking east from center.



44

Photo #44: Vegetation of Removal Area 3B, looking east from center.

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Vegetation Documentation Photographs



Figure
2-11



45

Photo #45: Vegetation of Removal Area 13A, looking southeast from former dam location.



46

Photo #46: Vegetation of Removal Area 13A, looking west.

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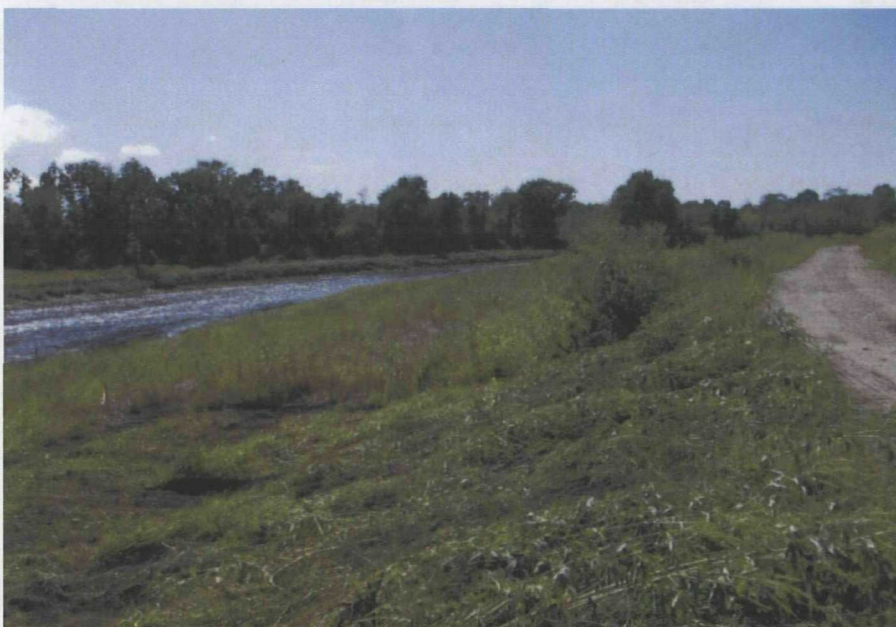


Figure
2-12



47

Photo #47: Vegetation of Removal Area 12A-1, looking west.



48

Photo #48: Vegetation of Removal Area 11A, looking west from gas pipeline.

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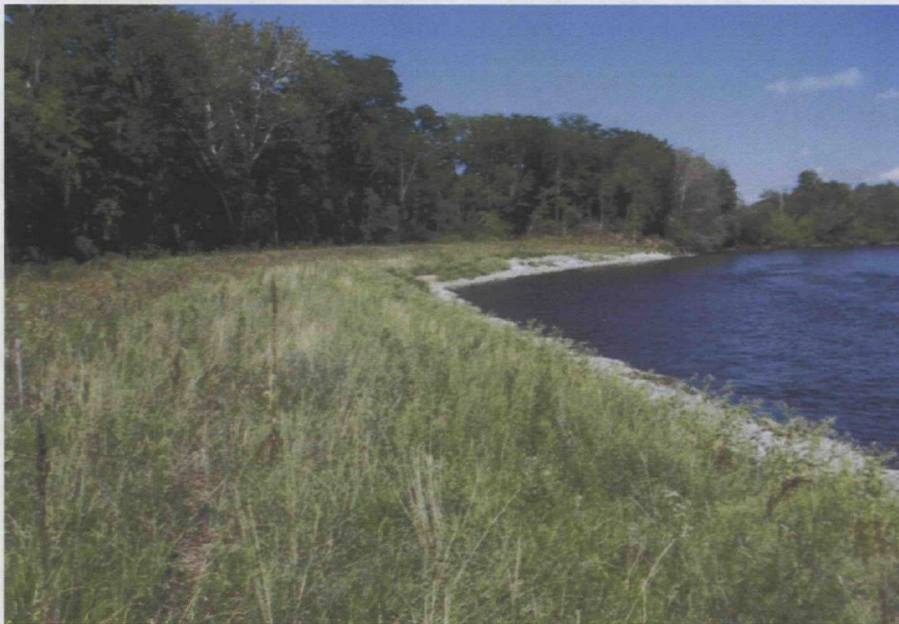


Figure
2-13



49

Photo #49: Vegetation of Removal Area 8A, looking east from west end.



50

Photo #50: Vegetation of Removal Area 9A, looking east from west end.

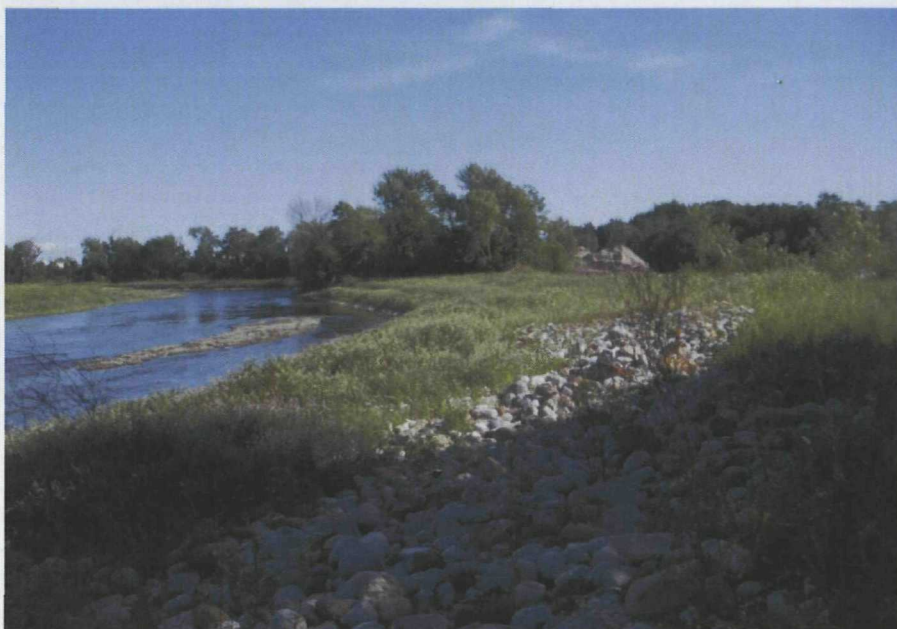
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Figure
2-14



51

Photo #51: Vegetation of Removal Area 13B, looking east from west end.



52

Photo #52: Vegetation of Removal Area 12B, looking west from east end.

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Vegetation Documentation Photographs



Figure
2-15

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Attachment 3

Herbaceous Vegetation
Monitoring Data

Kalamazoo River Study Group
 Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
 Former Plainwell Impoundment TCRA
 Former Plainwell Impoundment 2009 Bank Conditions Monitoring Report

Table 3-1 - Herbaceous Ground Cover in Sample Plots of Removal Area 1

Observed Vegetation		300%													
Common Name	Scientific Name	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 10	Plot 11	Plot 12	Plot 13	Plot 14
Bee Balm	<i>Monarda didyma</i>								5%		5%		<5%		5%
Black Eyed Susan	<i>Rudbeckia hirta</i>				60%		60%		40%		60%		80%	20%	70%
Aster sp.	<i>Aster sp.</i>	10%													
Black Medic	<i>Medicago lupulina</i>							5%							
Blue Joint Grass	<i>Calamagrostis canadensis</i>											30%			
Broad Leaf Plantain	<i>Plantago major</i>			<5%											
Bromegrass	<i>Bromus sp.</i>												10%		
Bushy Aster	<i>Aster dumosus</i>									10%		5%		10%	
Cardinal Flower	<i>Lobelia cardinalis</i>	5%													
Canada Thistle	<i>Cirsium arvense</i>													5%	
Choke Cherry	<i>Prunus virginiana</i>												<5%		
Common Mountain Mint	<i>Pycnanthemum virginianum</i>		15%					<5%		<5%		<5%			
Common Ragweed	<i>Ambrosia artemisiifolia</i>	10%	10%	20%	5%	20%		20%		10%					
Coneflower	<i>Echinacea sp.</i>				10%	5%									
Crab Grass	<i>Digitaria ischaemum</i>					<5%						<5%			5%
Curled Dock	<i>Rumex crispus</i>		5%							5%			<5%		
Daisy Fleabane	<i>Erigeron annuus</i>		20%			5%		10%	<5%	10%		20%			
Evening Primrose	<i>Oenothera biennis</i>										5%		5%		10%
False Nettle	<i>Boehmeria cylindrica</i>	<5%				<5%									
Fox Sedge	<i>Carex vulpinoidea</i>	50%													
Gray Coneflower	<i>Rudbeckia sp.</i>								25%		20%		5%	15%	
Great Ragweed	<i>Ambrosia trifida</i>											20%			
Green Foxtail	<i>Setaria viridis</i>				<5%										
Goldenrod	<i>Solidago sp.</i>	<5%													
Great Blue Lobelia	<i>Lobelia siphilitica</i>	10%													
Grey-headed Coneflower	<i>Ratibida pinnata</i>						25%								
Hairy Aster	<i>Aster pilosus</i>		10%	10%		30%		10%		10%				30%	
Hedge Bindweed	<i>Convolvulus sepium</i>											<5%			
Horseweed	<i>Erigeron canadensis</i>			<5%	<5%	<5%						5%			
Lance-leaved Coreopsis	<i>Coreopsis lanceolata</i>				5%		<5%		10%		5%			10%	10%
Lady's Thumb	<i>Polygonum persicaria</i>	<5%													
New England Aster	<i>Aster nova-angliae</i>		10%	10%				30%		5%		15%			
Panic Grass	<i>Panicum sp.</i>		<5%												
Path Rush	<i>Juncus tenuis</i>			15%		<5%									
Pennsylvania Smartweed	<i>Polygonum pennsylvanicum</i>	<5%													
Perennial Rye	<i>Lolium perenne</i>							<5%			<5%				
Queen Anne's Lace	<i>Daucus carota</i>									30%					
Red Clover	<i>Trifolium pratense</i>					5%		5%		<5%					
Red Top	<i>Agrostis alba</i>					5%									
Red-osier Dogwood	<i>Cornus stolonifera</i>							15%							
Reed Canary Grass*	<i>Phalaris arundinacea</i>													5%	
Rough Stem Cinquefoil	<i>Potentilla norvegica</i>									5%					
Sedge	<i>Carex sp.</i>				<5%	10%	<5%		10%					5%	
Spotted Knapweed	<i>Centaurea sp.</i>						15%					5%			
Tall Goldenrod	<i>Solidago altissima</i>		20%							15%					

Kalamazoo River Study Group
 Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
 Former Plainwell Impoundment TCRA
 Former Plainwell Impoundment 2009 Bank Conditions Monitoring Report

Table 3-1 - Herbaceous Ground Cover in Sample Plots of Removal Area 1

Observed Vegetation		300%													
Common Name	Scientific Name	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 10	Plot 11	Plot 12	Plot 13	Plot 14
Timothy	<i>Phleum pratense</i>								<5%						
Unknown Grass	<i>Poa sp.</i>				5%	5%		<5%	5%		5%		<5%		
Unknown Mustard	<i>Brassica sp.</i>									<5%					
White Clover	<i>Trifolium repens</i>	5%		15%	15%	5%		5%		<5%					
Wild Lettuce	<i>Lactuca canadensis</i>								<5%	<5%					
Wool Grass	<i>Scirpus cyperinus</i>	10%													
Wild Strawberry	<i>Fragaria virginiana</i>								5%						
Yellow Foxtail	<i>Setaria glauca</i>	<5%		15%		<5%									
Yellow Hop Clover	<i>Trifolium agrarium</i>					5%									
Yellow Least Hop Clover	<i>Trifolium dubium</i>														<5%
Yellow Wood Sorrel	<i>Oxalis europaea</i>	<5%	10%	5%		<5%									
Ground Cover		100%	100%	90%	100%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Average % Ground Cover		99%													

* Denotes invasive species.

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Table 3-2 - Herbaceous Ground Cover in Sample Plots of Removal Area 2A

Observed Vegetation		% Cover		
Common Name	Scientific Name	Plot 15	Plot 16	Plot 17
Barnyard Grass	<i>Echinochloa crusgalli</i>		<5%	<5%
Bee Balm	<i>Monarda didyma</i>	35%		
Black Eyed Susan	<i>Rudbeckia hirta</i>	25%		
Blue Vervain	<i>Verbena hastata</i>			95%
Canada Wild Rye	<i>Elymus canadensis</i>	<5%		
Clearweed	<i>Pilea pumila</i>			<5%
Common Ragweed	<i>Ambrosia artemisiifolia</i>	5%	<5%	
Gray Coneflower	<i>Rudbeckia</i> sp.	10%		
Horseweed	<i>Erigeron canadensis</i>	5%		
Illinois Sensitive Plant	<i>Desmanthus illinoensis</i>	<5%		
Nodding Smartweed	<i>Polygonum lapathifolium</i>		<5%	
Path Rush	<i>Juncus tenuis</i>		<5%	
Perennial Rye	<i>Lolium perenne</i>	<5%	<5%	
Purplestem beggar-Ticks	<i>Bidens connata</i>		20%	
Reed Canary Grass*	<i>Phalaris arundinacea</i>			<5%
Rice Cutgrass	<i>Leersia oryzoides</i>		55%	
Rough Stem Cinquefoil	<i>Potentilla norvegica</i>	5%		
Sedge	<i>Carex lurida</i>		10%	
Sedge	<i>Carex</i> sp.			<5%
Swamp Milkweed	<i>Asclepias incarnata</i>		<5%	
Timothy	<i>Phleum pratense</i>	<5%		
Unknown Grass	<i>Poa</i> sp.	15%		
Virginia Wild Rye	<i>Elymus virginicus</i>	<5%		
Yellow Nut Sedge	<i>Cyperus esculentus</i>		15%	5%
Yellow Wood Sorrel	<i>Oxalis europaea</i>	<5%		
Total % Ground Cover		100%	100%	100%
Average % Ground Cover		100%		

* Denotes invasive species.

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Table 3-3 - Herbaceous Ground Cover in Sample Plots of Removal Area Island 3

Observed Vegetation		% Cover			
Common Name	Scientific Name	Plot 37	Plot 38	Plot 39	Plot 40
Arrowhead	<i>Sagittaria latifolia</i>	5%			
Common Bur Reed	<i>Sparganium eurycarpum</i>	15%			
Cottonwood	<i>Populus deltoides</i>			<5%	
Duckweed	<i>Lemna sp.</i>		<5%		
Green Amaranth	<i>Amaranthus retroflexus</i>		10%		
Lady's Thumb	<i>Polygonum persicaria</i>		5%	5%	
Needle Spike Rush	<i>Eleocharis smallii</i>		20%		
Nodding Smartweed	<i>Polygonum lapathifolium</i>	10%		95%	
Reed Canary Grass*	<i>Phalaris arundinacea</i>	15%			15%
Rice Cutgrass	<i>Leersia oryzoides</i>	50%	35%		50%
Silver Maple	<i>Acer saccharinum</i>	5%		<5%	
Soft Stem Bulrush	<i>Scirpus validus</i>				10%
Unknown Grass	<i>Poa sp.</i>	<5%			
Water Pepper	<i>Polygonum hydropiper</i>		10%		
Water Purslane	<i>Ludwigia palustris</i>		5%		
Yellow Nut Sedge	<i>Cyperus esculentus</i>		5%	<5%	5%
Spike Rush	<i>Eleocharis carabea</i>				20%
Total % Ground Cover		100%	90%	100%	100%
Average % Ground Cover		98%			

* Denotes invasive species.

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Table 3-4 - Herbaceous Ground Cover in Sample Plots of Removal Area 3A

Observed Vegetation		% Cover									
Common Name	Scientific Name	Plot 18	Plot 19	Plot 20	Plot 21	Plot 22	Plot 23	Plot 24	Plot 25	Plot 26	Plot 27
Barnyard Grass	<i>Echinochloa crusgalli</i>	5%				<5%		<5%			
Bee Balm	<i>Monarda didyma</i>		5%	5%							
Black Eyed Susan	<i>Rudbeckia hirta</i>	20%	30%	50%	25%	10%	10%	20%	20%		
Blue Vervain	<i>Verbena hastata</i>	5%									
Bushy Aster	<i>Aster dumosus</i>					20%	10%	5%		5%	
Canada Wild Rye	<i>Elymus canadensis</i>				10%		10%	10%	15%		
Common Dandelion	<i>Taraxacum officinale</i>				5%				5%		
Common Ragweed	<i>Ambrosia artemisiifolia</i>			5%			10%		<5%		
Cottonwood	<i>Populus deltoides</i>	<5%	5%	<5%			5%				
Curled dock	<i>Rumex crispus</i>	15%					5%				
Daisy Fleabane	<i>Erigeron annuus</i>						10%		10%		
Dotted Smartweed	<i>Polygonum punctatum</i>					<5%					
Evening Primrose	<i>Oenothera biennis</i>			10%							
Field Bindweed	<i>Convolvulus arvensis</i>							5%		5%	
Giant Foxtail	<i>Setaria faberii</i>										5%
Gray Coneflower	<i>Rudbeckia</i> sp.		10%	5%					10%		
Great Ragweed	<i>Ambrosia trifida</i>				10%	10%	10%		15%	15%	
Green Foxtail	<i>Setaria viridis</i>					5%					<5%
Hedge Bindweed	<i>Convolvulus sepium</i>				5%			10%			
Horseweed	<i>Erigeron canadensis</i>		<5%	<5%							
Jewelweed	<i>Impatiens capensis</i>	5%									
Lady's Thumb	<i>Polygonum persicaria</i>										50%
Lance-leaved Coreopsis	<i>Coreopsis lanceolata</i>		5%								
Late Goldenrod	<i>Solidago gigantea</i>							15%			
New England Aster	<i>Aster nova-angliae</i>				5%						
Northern Willow Herb	<i>Epilobium saximontanum (glandulosum)</i>	15%									
Pennsylvania Smartweed	<i>Polygonum pennsylvanicum</i>					15%					
Perennial Rye	<i>Lolium perenne</i>	15%	<5%		5%	5%	10%	15%	5%		
Pigweed	<i>Amaranthus</i> sp.										15%
Quack Grass	<i>Agropyron repens</i>										25%
Red-osier Dogwood	<i>Cornus stolonifera</i>			5%						10%	
Reed Canary Grass*	<i>Phalaris arundinacea</i>		<5%	<5%	20%	30%	15%	5%	20%	50%	

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Table 3-4 - Herbaceous Ground Cover in Sample Plots of Removal Area 3A

Observed Vegetation		% Cover									
Common Name	Scientific Name	Plot 18	Plot 19	Plot 20	Plot 21	Plot 22	Plot 23	Plot 24	Plot 25	Plot 26	Plot 27
Riverbank Grape	<i>Vitis riparia</i>				<5%						
Rough Stem Cinquefoil	<i>Potentilla norvegica</i>	5%	10%	15%			5%				
Sedge	<i>Carex sp.</i>								<5%		
Silver Maple	<i>Acer saccharinum</i>				<5%	<5%					
Tall Goldenrod	<i>Solidago altissima</i>				5%						
Timothy	<i>Phleum pratense</i>		5%	5%							
Unknown Brome	<i>Bromus sp.</i>	5%	10%								
Unknown Clover	<i>Trifolium sp.</i>						<5%				
Unknown Grass	<i>Poa sp.</i>				5%	5%				5%	
Unknown Mustard	<i>Brassica sp.</i>				5%						
Velvet Leaf	<i>Abutilon theophrasti</i>										5%
Water Smartweed	<i>Polygonum amphibium</i>							5%			
White Clover	<i>Trifolium repens</i>							10%			
White Sweet Clover	<i>Melilotus alba</i>		20%								
Wild Mint	<i>Mentha arvensis</i>									10%	
Yellow Foxtail	<i>Setaria glauca</i>	10%									
Total % Ground Cover		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Average % Ground Cover		100%									

* Denotes invasive species.

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Table 3-5 - Herbaceous Ground Cover in Sample Plots of Removal Area 3B

Observed Vegetation		% Cover								
Common Name	Scientific Name	Plot 72	Plot 73	Plot 74	Plot 75	Plot 76	Plot 77	Plot 78	Plot 79	Plot 80
Bee Balm	<i>Monarda didyma</i>			5%						<5%
Black Eyed Susan	<i>Rudbeckia hirta</i>			50%	<5%	70%	15%	10%	35%	55%
Blue Lobelia	<i>Lobelia sp.</i>		5%		5%		10%			
Canada Thistle	<i>Cirsium arvense</i>				5%					
Canada Wild Rye	<i>Elymus canadensis</i>			25%		5%		20%	15%	
Catnip	<i>Nepeta cataria</i>							30%	<5%	<5%
Common Mountain Mint	<i>Pycnanthemum virginianum</i>				10%		20%			
Common Ragweed	<i>Ambrosia artemisiifolia</i>	5%	35%		<5%					
Cottonwood	<i>Populus deltoides</i>				5%					
Crown Vetch	<i>Coronilla varia</i>							30%		
Curled dock	<i>Rumex crispus</i>	5%			10%		5%		5%	10%
Daisy Fleabane	<i>Erigeron annuus</i>		10%	5%						
Dark Green Bulrush	<i>Scirpus atrovirens</i>						5%			
Doorweed	<i>Polygonum aviculare</i>	<5%								
Evening Primrose	<i>Oenothera biennis</i>					5%			10%	
Frank's Sedge	<i>Carex frankii</i>		<5%							
Gray Coneflower	<i>Rudbeckia sp.</i>					15%				20%
Great Ragweed	<i>Ambrosia trifida</i>		15%	5%						
Green Ash	<i>Fraxinus pennsylvanica</i>						<5%			
Hairy Aster	<i>Aster pilosus</i>									<5%
Joe Pye Weed	<i>Eupatorium maculatum</i>				5%					
Lance-leaved Coreopsis	<i>Coreopsis lanceolata</i>					5%			20%	
New England Aster	<i>Aster nova-angliae</i>	10%					5%			
Pennsylvania Smartweed	<i>Polygonum pensylvanicum</i>	5%								
Perennial Rye	<i>Lolium perenne</i>				10%					
Prickly Lettuce	<i>Lactuca serriola (scariola)</i>		5%				5%			
Queen Anne's Lace	<i>Daucus carota</i>									15%
Red-osier Dogwood	<i>Cornus stolonifera</i>			5%						
Reed Canary Grass*	<i>Phalaris arundinacea</i>								5%	
Shallow Sedge	<i>Carex lurida</i>	65%	10%		25%		20%			
Spotted Jewelweed	<i>Impatiens capensis</i>	10%								
Tall Coneflower	<i>Rudbeckia laciniata</i>			5%	25%		15%	5%		
Unknown		<5%								
Unknown Grass	<i>Poa sp.</i>								5%	
White Vervain	<i>Verbena urticifolia</i>		20%					5%		
Wild Mint	<i>Mentha arvensis</i>							<5%		
Yellow Wood Sorrel	<i>Oxalis europaea</i>								5%	
Total % Ground Cover		100%	100%	100%	100%	100%	100%	100%	100%	100%
Average % Ground Cover		100%								

* Denotes invasive species.

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Table 3-6 - Herbaceous Ground Cover in Sample Plots of Removal Area 4A

Observed Vegetation		% Cover						
Common Name	Scientific Name	Plot 28	Plot 29	Plot 30	Plot 31	Plot 32	Plot 33	Plot 34
Arrowhead	<i>Sagittaria latifolia</i>					5%	40%	
Barnyard Grass	<i>Echinochloa crusgalli</i>				5%	10%	<5%	
Bee Balm	<i>Monarda didyma</i>			5%	5%			
Black Eyed Susan	<i>Rudbeckia hirta</i>	15%	70%	30%	25%	5%		80%
Bushy Aster	<i>Aster dumosus</i>		10%					<5%
Canada Wild Rye	<i>Elymus canadensis</i>	10%		<5%				10%
Common Mullein	<i>Verbascum thapsus</i>			<5%				
Cottonwood	<i>Populus deltoides</i>	10%	<5%	<5%				
Curled dock	<i>Rumex crispus</i>			5%				
Evening Primrose	<i>Oenothera biennis</i>			10%	15%			
Gray Coneflower	<i>Rudbeckia</i> sp.	20%	<5%	10%				5%
Great Ragweed	<i>Ambrosia trifida</i>		<5%					
Green Foxtail	<i>Setaria viridis</i>		<5%					
Hedge Bindweed	<i>Convolvulus sepium</i>							<5%
Horseweed	<i>Erigeron canadensis</i>			15%	5%			
Lady's Thumb	<i>Polygonum persicaria</i>						15%	
Lance-leaved Coreopsis	<i>Coreopsis lanceolata</i>	35%	<5%	10%	10%			
Milkweed	<i>Asclepias</i> sp.			<5%				
New England Aster	<i>Aster nova-angliae</i>							<5%
Perennial Rye	<i>Lolium perenne</i>		<5%		15%			
Pigweed	<i>Amaranthus</i> sp.	10%						
Prairie Dock	<i>Silphium terebinthinaceum</i>							<5%
Quack Grass	<i>Agropyron repens</i>	<5%						
Rice Cutgrass	<i>Leersia oryzoides</i>					70%	20%	
Rough Stem Cinquefoil	<i>Potentilla norvegica</i>		10%	15%	5%			
Silver Maple	<i>Acer saccharinum</i>			<5%	<5%	<5%	5%	
Timothy	<i>Phleum pratense</i>				5%			
Unknown Grass	<i>Poa</i> sp.		<5%		10%			5%
Water Purslane	<i>Ludwigia palustris</i>					5%	15%	
Water Smartweed	<i>Polygonum amphibium</i>		10%					
Smartweed	<i>Polygonum aquatica</i>						5%	
Total % Ground Cover		100%	100%	100%	100%	95%	100%	100%
Average % Ground Cover		99%						

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Table 3-7 - Herbaceous Ground Cover in Sample Plots of Removal Area 4B

Observed Vegetation		% Cover						
Common Name	Scientific Name	Plot 65	Plot 66	Plot 67	Plot 68	Plot 69	Plot 70	Plot 71
Blue Vervain	<i>Verbena hastata</i>	10%		5%			5%	
Bushy Aster	<i>Aster dumosus</i>					10%		
Common Mountain Mint	<i>Pycnanthemum virginianum</i>	15%	5%			20%		
Common Ragweed	<i>Ambrosia artemisiifolia</i>		10%	10%	25%			
Curled dock	<i>Rumex crispus</i>		5%					
Daisy Fleabane	<i>Erigeron annuus</i>		40%		15%			
Dark Green Bulrush	<i>Scirpus atrovirens</i>	<5%				<5%		5%
Gray Coneflower	<i>Rudbeckia sp.</i>				15%			
Great Blue Lobelia	<i>Lobelia siphilitica</i>	10%		5%		5%		
Great Ragweed	<i>Ambrosia trifida</i>	10%	20%	5%	5%	15%	15%	
Horseweed	<i>Erigeron canadensis</i>				<5%		5%	
New England Aster	<i>Aster nova-angliae</i>		<5%					
Perennial Rye	<i>Lolium perenne</i>		<5%				<5%	
Prickly Lettuce	<i>Lactuca serriola (scariola)</i>		<5%	5%	40%	5%	40%	
Shallow Sedge	<i>Carex lurida</i>	55%	<5%	65%		40%		75%
Silver Maple	<i>Acer saccharinum</i>			<5%				
Spotted Jewelweed	<i>Impatiens capensis</i>			5%				15%
Tall Coneflower	<i>Rudbeckia laciniata</i>		20%					
Tall Coreopsis	<i>Coreopsis tripteris</i>				<5%	5%		
Tall Goldenrod	<i>Solidago altissima</i>						35%	
Wild Strawberry	<i>Fragaria virginiana</i>		<5%					
Smartweed	<i>Polygonum aquatica</i>							5%
Total % Ground Cover		100%	100%	100%	100%	100%	100%	100%
Average % Ground Cover		100%						

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Table 3-8 - Herbaceous Ground Cover in Sample Plots of Removal Area 5

Observed Vegetation		% Cover	
Common Name	Scientific Name	Plot 35	Plot 36
Black Eyed Susan	<i>Rudbeckia hirta</i>	40%	5%
Canada Wild Rye	<i>Elymus canadensis</i>	10%	10%
Common Ragweed	<i>Ambrosia artemisiifolia</i>	<5%	20%
Curled dock	<i>Rumex crispus</i>	5%	10%
Daisy Fleabane	<i>Erigeron annuus</i>	5%	10%
Field Bindweed	<i>Convolvulus arvensis</i>	<5%	
Gray Coneflower	<i>Rudbeckia sp.</i>	5%	5%
Great Ragweed	<i>Ambrosia trifida</i>		15%
Hedge Bindweed	<i>Convolvulus sepium</i>	<5%	
Perennial Rye	<i>Lolium perenne</i>	10%	10%
Red Top	<i>Agrostis alba</i>	20%	
Rough Stem Cinquefoil	<i>Potentilla norvegica</i>	5%	
Swamp Tickseed	<i>Bidens tripartita</i>		5%
Virginia Wild Rye	<i>Elymus virginicus</i>	<5%	
Total % Ground Cover		100%	90%
Average % Ground Cover		95%	

* Denotes invasive species.

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Table 3-9 - Herbaceous Ground Cover in Sample Plots of Removal Area 6B

Observed Vegetation		% Cover				
Common Name	Scientific Name	Plot 41	Plot 42	Plot 43	Plot 44	Plot 45
Bee Balm	<i>Monarda didyma</i>					5%
Black Eyed Susan	<i>Rudbeckia hirta</i>		15%			30%
Bull Thistle	<i>Cirsium vulgare</i>			10%		
Bushy Aster	<i>Aster dumosus</i>		20%			
Canada Thistle	<i>Cirsium arvense</i>	20%	50%			
Common Mountain Mint	<i>Pycnanthemum virginianum</i>	<5%	<5%			
Common Ragweed	<i>Ambrosia artemisiifolia</i>	5%				5%
Daisy Fleabane	<i>Erigeron annuus</i>		5%			
Dark Green Bulrush	<i>Scirpus atrovirens</i>	5%				
Giant Foxtail	<i>Setaria faberii</i>				20%	
Gray Coneflower	<i>Rudbeckia sp.</i>					10%
Green Foxtail	<i>Setaria viridis</i>			<5%		<5%
Hedge Bindweed	<i>Convolvulus sepium</i>		5%			
Horseweed	<i>Erigeron canadensis</i>			20%		5%
Mouse-Ear Chickweed	<i>Cerastium vulgatum</i>			5%		
New England Aster	<i>Aster nova-angliae</i>		5%			
Nodding Smartweed	<i>Polygonum lapathifolium</i>	10%			35%	5%
Panic Grass	<i>Panicum sp.</i>				15%	
Perennial Rye	<i>Lolium perenne</i>			5%		10%
Reed Canary Grass*	<i>Phalaris arundinacea</i>	10%		10%		
Rice Cutgrass	<i>Leersia oryzoides</i>				30%	
Rough Stem Cinquefoil	<i>Potentilla norvegica</i>			10%		
Silver Maple	<i>Acer saccharinum</i>					<5%
Spotted Knapweed	<i>Centaurea sp.</i>			10%		
Timothy	<i>Phleum pratense</i>					5%
Unknown Brome	<i>Bromus sp..</i>					25%
Velvet Leaf	<i>Abutilon theophrasti</i>	<5%				
White Campion	<i>Lychnis alba</i>			10%		
Wild Strawberry	<i>Fragaria virginiana</i>			10%		
Total % Ground Cover		50%	100%	90%	100%	100%
Average % Ground Cover		88%				

* Denotes invasive species.

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Table 3-10 - Herbaceous Ground Cover in Sample Plots of Removal Area 7

Observed Vegetation		% Cover		
Common Name	Scientific Name	Plot 46	Plot 47	Plot 48
Barnyard Grass	<i>Echinochloa crusgalli</i>			10%
Bee Balm	<i>Monarda didyma</i>		20%	
Black Eyed Susan	<i>Rudbeckia hirta</i>		20%	
Black Medic	<i>Medicago lupulina</i>	10%	5%	
Common Ragweed	<i>Ambrosia artemisiifolia</i>	10%		
Dotted Smartweed	<i>Polygonum punctatum</i>		<5%	
Downy Brome	<i>Bromus tectorum</i>	<5%		
Gray Coneflower	<i>Rudbeckia sp.</i>		5%	
Great Ragweed	<i>Ambrosia trifida</i>	5%		
Green Foxtail	<i>Setaria viridis</i>	30%	35%	
Illinois Sensitive Plant	<i>Desmanthus illinoensis</i>		5%	
Nodding Smartweed	<i>Polygonum lapathifolium</i>			20%
Perennial Rye	<i>Lolium perenne</i>	5%		
Quack Grass	<i>Agropyron repens</i>		<5%	
Red-osier Dogwood	<i>Cornus stolonifera</i>	15%		
Reed Canary Grass*	<i>Phalaris arundinacea</i>	<5%		
Rice Cutgrass	<i>Leersia oryzoides</i>			70%
Rose Coreopsis	<i>Coreopsis rosea</i>	20%		
Silver Maple	<i>Acer saccharinum</i>	<5%	<5%	
Sow Thistle	<i>Sonchus sp.</i>		5%	
Swamp Milkweed	<i>Asclepias incarnata</i>		<5%	
Smartweed	<i>Polygonum aquaticum</i>		5%	
Total % Ground Cover		95%	100%	100%
Average % Ground Cover			98%	

* Denotes invasive species.

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Table 3-11 - Herbaceous Ground Cover in Sample Plots of Removal Area 8

Observed Vegetation		% Cover			
Common Name	Scientific Name	Plot 49	Plot 50	Plot 51	Plot 52
Barnyard Grass	<i>Echinochloa crusgalli</i>				<5%
Black Bindweed	<i>Polygonum convolvulus</i>			5%	
Blue Vervain	<i>Verbena hastata</i>			5%	
Common Dandelion	<i>Taraxacum officinale</i>			5%	
Cottonwood	<i>Populus deltoides</i>			40%	10%
Curled dock	<i>Rumex crispus</i>			15%	
Evening Primrose	<i>Oenothera biennis</i>				5%
Giant Foxtail	<i>Setaria faberii</i>			20%	5%
Great Ragweed	<i>Ambrosia trifida</i>				15%
Mouse-Ear Chickweed	<i>Cerastium vulgatum</i>			5%	
Nodding Smartweed	<i>Polygonum lapathifolium</i>	90%			25%
Pennsylvania Smartweed	<i>Polygonum pennsylvanicum</i>				15%
Red-osier Dogwood	<i>Cornus stolonifera</i>			5%	
Reed Canary Grass*	<i>Phalaris arundinacea</i>		10%		
Rice Cutgrass	<i>Leersia oryzoides</i>	10%	5%		
Sedge	<i>Carex sp.</i>				<5%
Silver Maple	<i>Acer saccharinum</i>			<5%	10%
Unknown Mustard	<i>Brassica sp.</i>				5%
Witch Grass	<i>Panicum capillare</i>				10%
Wool Grass	<i>Scirpus cyperinus</i>		85%		
Total % Ground Cover		100%	100%	100%	100%
Average % Ground Cover		100%			

* Denotes invasive species.

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Table 3-12 - Herbaceous Ground Cover in Sample Plots of Removal Area 9A

Observed Vegetation		% Cover			
Common Name	Scientific Name	Plot 110	Plot 111	Plot 112	Plot 113
American Elm	<i>Ulmus americana</i>		5%		
Bee Balm	<i>Monarda didyma</i>		25%		25%
Black Eyed Susan	<i>Rudbeckia hirta</i>		10%		10%
Canada Wild Rye	<i>Elymus canadensis</i>	15%			
Common Ragweed	<i>Ambrosia artemisiifolia</i>	5%			
Curled dock	<i>Rumex crispus</i>	10%		10%	
Fall Panicum	<i>Panicum dichotomiflorum</i>			15%	
Giant Foxtail	<i>Setaria faberii</i>				30%
Great Ragweed	<i>Ambrosia trifida</i>	25%			
Green Foxtail	<i>Setaria viridis</i>	25%			10%
Horseweed	<i>Erigeron canadensis</i>		5%		10%
Perennial Rye	<i>Lolium perenne</i>	20%	25%	70%	15%
Red-osier Dogwood	<i>Cornus stolonifera</i>		5%		
Rough Stem Cinquefoil	<i>Potentilla norvegica</i>		10%		
Velvet Leaf	<i>Abutilon theophrasti</i>			5%	
White Campion	<i>Lychnis alba</i>		10%		
Total % Ground Cover		100%	95%	100%	100%
Average % Ground Cover		99%			

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Table 3-13 - Herbaceous Ground Cover in Sample Plots of Removal Area 9B

Observed Vegetation		% Cover		
Common Name	Scientific Name	Plot 53	Plot 54	Plot 55
Barnyard Grass	<i>Echinochloa crusgalli</i>		10%	<5%
Broad-Leaved Dock	<i>Rumex obtusifolius</i>			10%
Canada Thistle	<i>Cirsium arvense</i>	5%		
Common Dandelion	<i>Taraxacum officinale</i>	10%		
Common Three-seed Mercury	<i>Acalypha rhomboidea</i>			<5%
Cottonwood	<i>Populus deltoides</i>	15%	5%	
Curled dock	<i>Rumex crispus</i>			<5%
Green Amaranth	<i>Amaranthus retroflexus</i>		5%	20%
Lady's Thumb	<i>Polygonum persicaria</i>		15%	15%
Perennial Rye	<i>Lolium perenne</i>	15%	20%	35%
Red Top	<i>Agrostis alba</i>			<5%
Red-osier Dogwood	<i>Cornus stolonifera</i>	25%		
Rough Stem Cinquefoil	<i>Potentilla norvegica</i>	5%		
Silver Maple	<i>Acer saccharinum</i>	<5%		
Sow Thistle	<i>Sonchus sp.</i>	<5%		
Blue Vervain	<i>Verbena hastata</i>		5%	
Water Purslane	<i>Ludwigia palustris</i>		20%	10%
White Clover	<i>Trifolium repens</i>	15%		
Wild Lettuce	<i>Lactuca canadensis</i>	5%		
Yellow Nut Sedge	<i>Cyperus esculentus</i>		10%	10%
Yellow Wood Sorrel	<i>Oxalis europaea</i>	5%		
Total % Ground Cover		100%	90%	100%
Average % Ground Cover			97%	

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Table 3-14 - Herbaceous Ground Cover in Sample Plots of Removal Area 10A

Observed Vegetation		% Cover			
Common Name	Scientific Name	Plot 106	Plot 107	Plot 108	Plot 109
Bee Balm	<i>Monarda didyma</i>		15%	10%	
Blue Vervain	<i>Verbena hastata</i>				5%
Common Mullein	<i>Verbascum thapsus</i>			5%	
Common Ragweed	<i>Ambrosia artemisiifolia</i>			5%	15%
Curled dock	<i>Rumex crispus</i>	5%			
Fall Panicum	<i>Panicum dichotomiflorum</i>		10%		
Giant Foxtail	<i>Setaria faberii</i>	20%	25%		30%
Great Ragweed	<i>Ambrosia trifida</i>				5%
Green Foxtail	<i>Setaria viridis</i>	5%	5%	70%	10%
Hair Grass	<i>Deschampsia sp.</i>	5%			
Lady's Thumb	<i>Polygonum persicaria</i>		5%	5%	
Nodding Smartweed	<i>Polygonum lapathifolium</i>	10%			
Perennial Rye	<i>Lolium perenne</i>	20%	5%		20%
Pigweed	<i>Amaranthus sp.</i>	25%	20%		5%
Quack Grass	<i>Agropyron repens</i>		5%		
Rough Stem Cinquefoil	<i>Potentilla norvegica</i>	5%			
Witch Grass	<i>Panicum capillare</i>	<5%			
Yellow Cress	<i>Rorippa sp.</i>				5%
Yellow Wood Sorrel	<i>Oxalis europaea</i>			5%	
Total % Ground Cover		95%	90%	100%	95%
Average % Ground Cover		95%			

* Denotes invasive species.

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Table 3-15 - Herbaceous Ground Cover in Sample Plots of Removal Area 10B

Observed Vegetation		% Cover									
Common Name	Scientific Name	Plot 56	Plot 57	Plot 58	Plot 59	Plot 60	Plot 61	Plot 62	Plot 63	Plot 64	Plot 65
Barnyard Grass	<i>Echinochloa crusgalli</i>	<5%		5%		10%		35%			
Bee Balm	<i>Monarda didyma</i>						35%		<5%		
Black Eyed Susan	<i>Rudbeckia hirta</i>		20%				10%		20%		
Black Medic	<i>Medicago lupulina</i>		<5%						25%		
Blue Vervain	<i>Verbena hastata</i>									10%	
Broad-Leaved Dock	<i>Rumex obtusifolius</i>	5%									
Canada Wild Rye	<i>Elymus canadensis</i>		<5%						5%		
Catnip	<i>Nepeta cataria</i>				<5%						
Clearweed	<i>Pilea pumila</i>							<5%			
Cocklebur	<i>Xanthium strumarium</i>										40%
Common Dandelion	<i>Taraxacum officinale</i>			5%	5%						
Common Ragweed	<i>Ambrosia artemisiifolia</i>								10%		
Coneflower	<i>Echinacea sp.</i>		10%		5%				5%		
Curled dock	<i>Rumex crispus</i>			10%							
Daisy Fleabane	<i>Erigeron annuus</i>				15%						
Fall Panicum	<i>Panicum dichotomiflorum</i>				<5%					25%	
Giant Foxtail	<i>Setaria faberii</i>			20%							
Goldenrod	<i>Solidago sp.</i>			<5%							
Great Ragweed	<i>Ambrosia trifida</i>	20%									
Green Amaranth	<i>Amaranthus retroflexus</i>						10%			15%	
Green Foxtail	<i>Setaria viridis</i>	10%	30%	15%		10%	10%				
Horseweed	<i>Erigeron canadensis</i>	5%									
Nodding Smartweed	<i>Polygonum lapathifolium</i>	45%	<5%	20%	70%			50%	25%	50%	50%
Pennycress	<i>Thlaspi sp.</i>		<5%								
Perennial Rye	<i>Lolium perenne</i>			<5%	<5%	5%					5%
Pigweed	<i>Amaranthus sp.</i>	5%		5%			<5%	5%			
Reed Canary Grass*	<i>Phalaris arundinacea</i>					10%	35%				
Sedge	<i>Carex sp.</i>		15%			35%					
Silver Maple	<i>Acer saccharinum</i>		5%	<5%							
Slender Smartweed	<i>Polygonum setaceum</i>					30%	<5%				
Small Blue Violet	<i>Viola sororia (papilionacea)</i>							<5%			
Swamp Milkweed	<i>Asclepias incarnata</i>			5%							
Timothy	<i>Phleum pratense</i>								5%		
Velvet Leaf	<i>Abutilon theophrasti</i>	10%	5%	15%							
Water Purslane	<i>Ludwigia palustris</i>										<5%

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Table 3-15 - Herbaceous Ground Cover in Sample Plots of Removal Area 10B

Observed Vegetation		% Cover									
Common Name	Scientific Name	Plot 56	Plot 57	Plot 58	Plot 59	Plot 60	Plot 61	Plot 62	Plot 63	Plot 64	Plot 65
White Sweet Clover	<i>Melilotus alba</i>								5%		
Wild Lettuce	<i>Lactuca canadensis</i>		10%								
Daisy Fleabane	<i>Fragaria virginiana</i>		5%						<5%		
Yellow Cress	<i>Rorippa sp.</i>				<5%						
Total % Ground Cover		100%	100%	100%	95%	100%	100%	90%	100%	100%	95%
Average % Ground Cover		98%									

* Denotes invasive species.

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Table 3-16 - Herbaceous Ground Cover in Sample Plots of Removal Area 11A

Observed Vegetation		% Cover		
Common Name	Scientific Name	Plot 103	Plot 104	Plot 105
Barnyard Grass	<i>Echinochloa crusgalli</i>		15%	
Black Medic	<i>Medicago lupulina</i>	5%		
Cottonwood	<i>Populus deltoides</i>			5%
Fall Panicum	<i>Panicum dichotomiflorum</i>	10%		25%
Giant Foxtail	<i>Setaria faberii</i>	10%		
Lady's Thumb	<i>Polygonum persicaria</i>	20%	20%	20%
Nodding Smartweed	<i>Polygonum lapathifolium</i>	20%	15%	5%
Oats	<i>Avena sativa</i>		10%	5%
Perennial Rye	<i>Lolium perenne</i>	25%	30%	10%
Reed Canary Grass*	<i>Phalaris arundinacea</i>			10%
Rice Cutgrass	<i>Leersia oryzoides</i>			10%
Soft-Stem Bulrush	<i>Scirpus validus</i>			10%
White Sweet Clover	<i>Melilotus alba</i>	10%		
Total % Ground Cover		100%	90%	100%
Average % Ground Cover		97%		

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Table 3-17 - Herbaceous Ground Cover in Sample Plots of Removal Area 12A

Observed Vegetation		% Cover													
Common Name	Scientific Name	Plot 89	Plot 90	Plot 91	Plot 92	Plot 93	Plot 94	Plot 95	Plot 96	Plot 97	Plot 98	Plot 99	Plot 100	Plot 101	Plot 102
Barnyard Grass	<i>Echinochloa crusgalli</i>				5%			5%	15%	5%		10%		20%	15%
Bittersweet Nightshade	<i>Solanum dulcamara</i>												5%		
Black Eyed Susan	<i>Rudbeckia hirta</i>				20%		10%				5%	5%			
Blue Vervain	<i>Verbena hastata</i>					5%									
Canada Wild Rye	<i>Elymus canadensis</i>				10%				10%		10%	5%			
Clearweed	<i>Pilea pumila</i>												5%		
Common Ragweed	<i>Ambrosia artemisiifolia</i>				10%			5%			5%	10%			
Coneflower	<i>Echinacea sp.</i>				5%										
Curled dock	<i>Rumex crispus</i>						10%	5%	5%		<5%				
Doorweed	<i>Polygonum aviculare</i>						10%								
Dotted Smartweed	<i>Polygonum punctatum</i>						5%								
Fall Panicum	<i>Panicum dichotomiflorum</i>		5%	5%	10%	15%	5%	20%	15%	40%	10%	15%		20%	20%
Giant Foxtail	<i>Setaria faberii</i>			5%						5%		<5%			
Great Chickweed	<i>Cerastium maximum</i>					10%									
Great Ragweed	<i>Ambrosia trifida</i>						15%		10%	10%	10%				
Green Amaranth	<i>Amaranthus retroflexus</i>			<5%											
Green Foxtail	<i>Setaria viridis</i>				5%		5%	5%		<5%					
Lady's Thumb	<i>Polygonum persicaria</i>	10%		5%		40%			5%	15%	15%	25%	10%		
Nodding Smartweed	<i>Polygonum lapathifolium</i>	90%		75%	20%		30%	30%	15%	25%	30%	25%	60%	10%	15%
Northern Willow Herb	<i>Epilobium saximontanum (glandulosum)</i>								<5%						
Oats	<i>Avena sativa</i>		65%											5%	15%
Pennsylvania Smartweed	<i>Polygonum pennsylvanicum</i>								10%						
Perennial Rye	<i>Lolium perenne</i>		5%		10%	10%					15%		20%	30%	10%
Redroot Flatsedge	<i>Cyperus erythrorhizos</i>													15%	
Reed Canary Grass*	<i>Phalaris arundinacea</i>					10%									
Rice Cutgrass	<i>Leersia oryzoides</i>			10%		10%									
Silver Maple	<i>Acer saccharinum</i>						10%	5%	5%						
Unknown Grass	<i>Poa sp.</i>		25%												25%
Velvet Leaf	<i>Abutilon theophrasti</i>							5%			<5%	5%			
Water Pepper	<i>Polygonum hydropiper</i>							20%							
White Clover	<i>Trifolium repens</i>				<5%										
White Sweet Clover	<i>Melilotus alba</i>			<5%											
Wild Strawberry	<i>Fragaria virginiana</i>			<5%		<5%									
Yellow Cress	<i>Rorippa sp.</i>				5%		<5%		5%						
Yellow Foxtail	<i>Setaria glauca</i>								5%						
Total % Ground Cover		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Average % Ground Cover															

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Table 3-18 - Herbaceous Ground Cover in Sample Plots of Removal Area 12B

Observed Vegetation		% Cover				
Common Name	Scientific Name	Plot 119	Plot 120	Plot 121	Plot 122	Plot 123
Barnyard Grass	<i>Echinochloa crusgalli</i>	5%			15%	10%
Black Eyed Susan	<i>Rudbeckia hirta</i>		20%			5%
Broad Leaf Plantain	<i>Plantago major</i>				<5%	
Canada Thistle	<i>Cirsium arvense</i>					5%
Canada Wild Rye	<i>Elymus canadensis</i>		5%		5%	5%
Common Dandelion	<i>Taraxacum officinale</i>				<5%	
Common Mountain Mint	<i>Pycnanthemum virginianum</i>		5%			
Curled dock	<i>Rumex crispus</i>	5%			5%	
Dame's Violet	<i>Hesperis matronalis</i>			25%		
Dotted Smartweed	<i>Polygonum punctatum</i>				15%	
Fall Panicum	<i>Panicum dichotomiflorum</i>		10%	10%		10%
False Nettle	<i>Boehmeria cylindrica</i>			10%	5%	
Giant Foxtail	<i>Setaria faberii</i>	10%	15%			20%
Green Amaranth	<i>Amaranthus retroflexus</i>	5%				
Hairy Aster	<i>Aster pilosus</i>					5%
Jewelweed	<i>Impatiens capensis</i>	5%			10%	10%
Lady's Thumb	<i>Polygonum persicaria</i>	15%		35%		15%
Nodding Smartweed	<i>Polygonum lapathifolium</i>	15%	25%		15%	15%
Pennsylvania Smartweed	<i>Polygonum pennsylvanicum</i>			15%		
Perennial Rye	<i>Lolium perenne</i>	25%			10%	
Pigweed	<i>Amaranthus sp.</i>				5%	
Quack Grass	<i>Agropyron repens</i>				5%	
Rice Cutgrass	<i>Leersia oryzoides</i>	15%				
Sedge	<i>Carex sp.</i>		15%			
Summer Grape	<i>Vitis aestivalis</i>	<5%				
Swamp Tickseed	<i>Bidens tripartita</i>			5%		
Tall Coneflower	<i>Rudbeckia laciniata</i>		5%			
Yellow Cress	<i>Rorippa sp.</i>				10%	
Total % Ground Cover		100%	100%	100%	100%	100%
Average % Ground Cover		100%				

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Table 3-19 - Herbaceous Ground Cover in Sample Plots of Removal Area 13A

Observed Vegetation		% Cover							
Common Name	Scientific Name	Plot 81	Plot 82	Plot 83	Plot 84	Plot 85	Plot 86	Plot 87	Plot 88
Barnyard Grass	<i>Echinochloa crusgalli</i>	20%	10%	15%		25%	30%	15%	
Black Willow	<i>Salix nigra</i>						5%		
Boxelder	<i>Acer negundo</i>							<5%	
Canada Thistle	<i>Cirsium arvense</i>			<5%					
Common Dandelion	<i>Taraxacum officinale</i>						<5%		
Common Ragweed	<i>Ambrosia artemisiifolia</i>	5%							
Cottonwood	<i>Populus deltoides</i>				5%		5%		
Cursed Buttercup/Crowfoot	<i>Ranunculus sceleratus</i>						<5%		
Fall Panicum	<i>Panicum dichotomiflorum</i>	5%	80%			30%		<5%	
Great Ragweed	<i>Ambrosia trifida</i>			40%				10%	
Green Amaranth	<i>Amaranthus retroflexus</i>	5%				15%	5%		
Horseweed	<i>Erigeron canadensis</i>	<5%							
Lady's Thumb	<i>Polygonum persicaria</i>				5%			5%	30%
Nodding Smartweed	<i>Polygonum lapathifolium</i>	10%	10%	30%				70%	40%
Oats	<i>Avena sativa</i>	5%		<5%		<5%			
Perennial Rye	<i>Lolium perenne</i>	20%		15%					10%
Pigweed	<i>Amaranthus sp.</i>	5%							
Reed Canary Grass*	<i>Phalaris arundinacea</i>				5%				
Water Pepper	<i>Polygonum hydropiper</i>							<5%	
Water Purslane	<i>Ludwigia palustris</i>		<5%		<5%		5%		
Witch Grass	<i>Panicum capillare</i>					20%			
Yellow Nut Sedge	<i>Cyperus esculentus</i>					10%			
Total % Ground Cover		75%	100%	100%	15%	100%	50%	100%	80%
Average % Ground Cover		78%							

* Denotes invasive species.

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Table 3-20 - Herbaceous Ground Cover in Sample Plots of Removal Area 13B

Observed Vegetation		% Cover				
Common Name	Scientific Name	Plot 114	Plot 115	Plot 116	Plot 117	Plot 118
Barnyard Grass	<i>Echinochloa crusgalli</i>	10%	5%	25%	15%	25%
Common Ragweed	<i>Ambrosia artemisiifolia</i>					10%
Doorweed	<i>Polygonum aviculare</i>		5%			
Dotted Smartweed	<i>Polygonum punctatum</i>	<5%				
Fall Panicum	<i>Panicum dichotomiflorum</i>	40%	10%	20%		25%
Giant Foxtail	<i>Setaria faberii</i>	5%	10%	10%	20%	
Great Ragweed	<i>Ambrosia trifida</i>					5%
Green Amaranth	<i>Amaranthus retroflexus</i>		5%			
Hair Grass	<i>Deschampsia sp.</i>	5%				
Nodding Smartweed	<i>Polygonum lapathifolium</i>		10%	15%		15%
Oats	<i>Avena sativa</i>	10%	10%	10%	10%	5%
Perennial Rye	<i>Lolium perenne</i>	25%	15%	20%	50%	15%
Pigweed	<i>Amaranthus sp.</i>	5%	10%			
Water Pepper	<i>Polygonum hydropiper</i>					<5%
Total % Ground Cover		100%	80%	100%	95%	100%

Color printing is still available.

**Color Drum cartridges are on
back order.**

Color printing is still available.

**Color Drum cartridges are on
back order.**